HP Prime Graphing Calculator

Quick Start Guide

Edition 1

HP Part Number: NW280-1001

Download from Www.Somanuals.com. All Manuals Search And Download.

Keyboard Legend

The table and photo on the following page illustrate a few of the many features available on the HP Prime Graphing Calculator. These features, as well as other features of the calculator, are discussed in this quick start guide. For a complete list of features, refer to the *HP Prime Graphing Calculator User's Guide* available on the HP website: **http://www.hp.com/support**.

Legal Notices

This guide and any examples contained herein are provided "as is" and are subject to change without notice. Hewlett-Packard Company makes no warranty of any kind with regard to this guide, including, but not limited to, the implied warranties of merchantability, non-infringement and fitness for a particular purpose.

Hewlett-Packard Company shall not be liable for any errors or for incidental or consequential damages in connection with the furnishing, performance, or use of this guide or the examples contained herein.

Product Regulatory & Environment Information

Product Regulatory and Environment Information is provided on the CD shipped with this product.

Copyright © 2013 Hewlett-Packard Development Company, L.P.

Reproduction, adaptation, or translation of this guide is prohibited without prior written permission of Hewlett-Packard Company, except as allowed under the copyright laws.

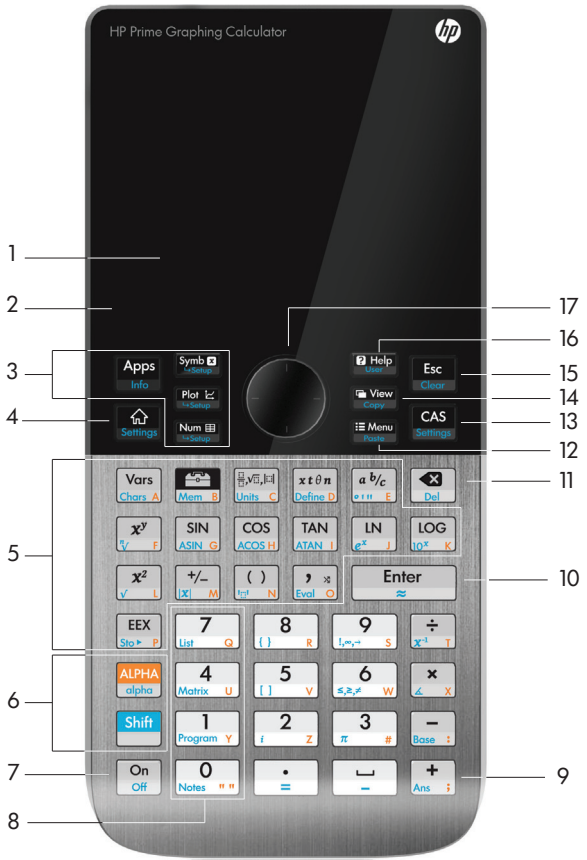
Printing History

Edition 1, May 2013

Download from Www.Somanuals.com. All Manuals Search And Download.

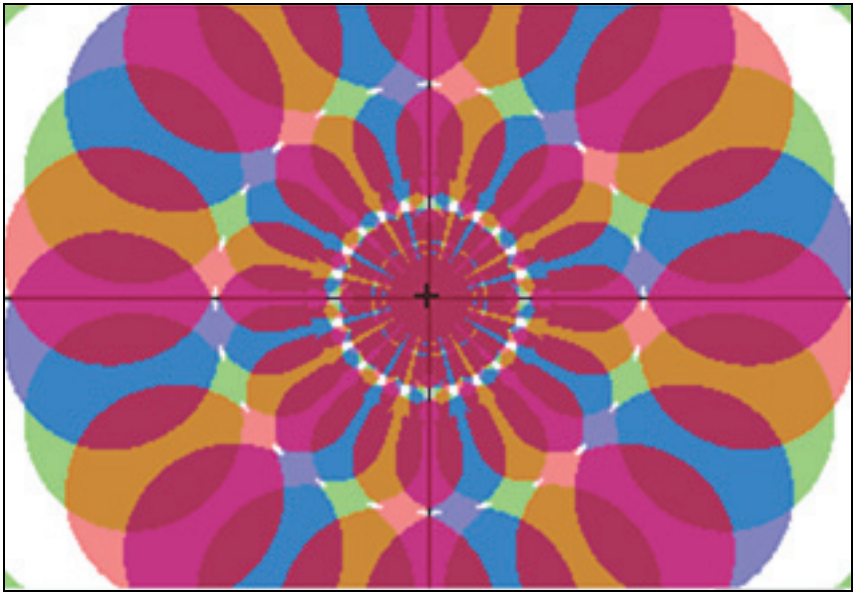
HP Prime: Keyboard Legend

Number	Feature
1	LCD and touch-screen: 320 × 240 pixels
2	Context-sensitive touch-button menu
3	HP Apps keys
4	Home view and Home preference settings
5	Common math and science functions
6	Alpha and Shift keys
7	On, Cancel and Off key
8	List, matrix, program, and note catalogs
9	Last Answer key (Ans)
10	Enter key
11	Backspace and Delete key
12	Menu (and Paste) key
13	CAS view and CAS preference settings
14	View (and Copy) key
15	Escape (and Clear) key
16	Help key
17	Rocker wheel (for cursor movement)



Download from Www.Somanuals.com. All Manuals Search And Download.

Create dazzling graphs with the Advanced Graphing app



Download from Www.Somanuals.com. All Manuals Search And Download.

Contents

1. Getting Started 1
   - Charging the Battery 2
   - Turning On and Off 3
   - Home View 3
   - Navigation 4
   - Home Settings 4
   - Entering and Editing Expressions 5
   - Entering Text 6
   - Editing, Deleting, and Clearing 7
   - Last Answer 7
   - Storing Values in Variables 7
   - Copy and Paste 8
   - Understanding the User Interface 9
   - Computer Algebra System (CAS) 10
2. HP Apps and their Views 13
   - HP Apps 13
   - App Views 15
   - Graphing Methods 17
3. Primary Apps 18
   - The Function, Advanced Graphing, Parametric, Polar, and Sequence Apps 18
   - Geometry App 27
   - Spreadsheet App 31
   - Statistics 1Var App 35

Download from Www.Somanuals.com. All Manuals Search And Download.

Statistics 2Var App 37
Inference App 39
DataStreamer App 40
Solve App 42
4. Solver Apps 43
Finance App 43
Linear Solver App 46
Triangle Solver App 47
5. Explorer Apps 48
Linear Explorer and Quadratic Explorer Apps 48
Trig Explorer App 50
6. Creating Customized Apps 52
7. The Toolbox Menus 53
Math Menu 53
CAS Menu 54
App Menu 54
User Menu 55
Catalog Menu (Catlg) 55
8. Catalogs and Editors 56
List Catalog and Editor 56
Matrix Catalog and Editor 57
Program Catalog and Editor 58
Note Catalog and Editor 60

Download from Www.Somanuals.com. All Manuals Search And Download.

1 Getting Started

The HP Prime Graphing Calculator is an easy-to-use yet powerful graphing calculator designed for secondary mathematics education and beyond. It offers hundreds of functions, and includes a computer algebra system (CAS) for symbolic calculations. This quick start guide covers basic tasks, such as entering and editing expressions, plotting their graphs, and creating tables of values generated by expressions. It also serves as an introduction to HP apps. HP apps are special applications designed for the study and exploration of a branch of mathematics or to solve problems of one or more special types. Advanced topics—such as the CAS, geometry, lists, matrices, programs, and the spreadsheet—are also briefly described. For detailed information, refer to the *HP Prime Graphing Calculator User Guide*. There is also online help available on the calculator. Press Help User to display information about the current screen, and for access to calculator-wide information.

The calculator's keypad provides access to unshifted functions and shifted functions. An unshifted function is one that you initiate by pressing a *single* key. For example, pressing Vars Chars A opens the Variables menu. A shifted function is initiated with a key *combination*. For example, to select the natural exponential function, you press Shift e^x LN J. Notice that the name or symbol of a shifted function is printed in blue or orange on the second line on the key. Certain operators and characters can also be entered by key combinations.

In order to help you differentiate between keypresses and on-screen display options, this guide uses the following conventions:

- A key that initiates an unshifted function is represented by an image of that key: for example, Symb Setup.
- A key combination that initiates a shifted function (or inserts a character) is represented by the appropriate shift key (Shift or ALPHA alpha) followed by the key for that function or character. For example, Shift e^x LN J initiates the natural exponential function and ALPHA alpha π 3 # inserts the pound character (#). The name of the shifted function may also be given after the key combination, as in Shift Esc Clear (Clear).
- A key pressed to insert a digit is represented by that digit: for example, 7.
- All fixed on-screen text—such as screen and field names—appears in bold: for example, **X Step**.
- Items you can select from a menu, and characters on the entry line, are set in a mono-spaced font: for example, `Function`, `Integrate`, `euler`, `Ans`, etc.
- A menu item selected by tapping the screen is represented by an image of that item: for example, Copy.

Download from Www.Somanuals.com. All Manuals Search And Download.

- Bread-crumb notation is used to represent a selection from sub-menus or sub-sub-menus. For example, "Select `Polynomial` > `Algebra` > `Quotient`" means first select `Polynomial`, then select `Algebra`, and finally select `Quotient`.
- Cursor keys are represented by ▲, ▼, ▶, and ◀. You use these keys to move from field to field on a screen, from one option to another in a menu, or from one plot to another when you have a number of functions plotted.

Charging the Battery

Charge the battery fully before using the calculator for the first time. To charge the battery, either:

- Connect the calculator to a computer using the USB cable that came in the package with your HP Prime. (The PC needs to be on for charging to occur.)
- Connect the calculator to a wall outlet using the HP-provided wall adapter.

When the calculator is on, a battery symbol appears in the title bar of the screen. Its appearance will indicate how much power the battery has. A flat battery will take approximately 4 hours to become fully charged.

⚠ Battery Warning

- To reduce the risk of fire or burns, do not disassemble, crush or puncture the battery; do not short the external contacts; and do not dispose of the battery in fire or water.
- To reduce potential safety risks, only use the battery provided with the calculator, a replacement battery provided by HP, or a compatible battery recommended by HP. There is a risk of explosion if the battery is replaced with one of an incompatible type.
- Dispose of a battery according to the instructions.
- Keep the battery away from children.
- If you encounter problems when charging the calculator, stop charging and contact HP immediately.

Download from Www.Somanuals.com. All Manuals Search And Download.

⚠ Adapter Warning

- To reduce the risk of electric shock or damage to equipment, only plug the wall adapter into an AC outlet that is easily accessible at all times.
- To reduce other potential safety risks, only use the wall adapter provided with the calculator, a replacement wall adapter provided by HP, or a wall adapter purchased as an accessory from HP.

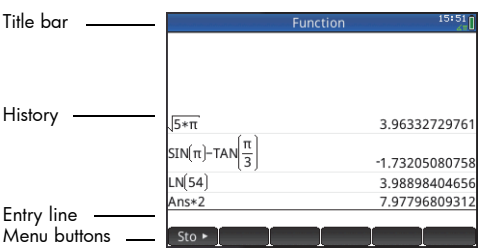
Turning On and Off

To turn the calculator on, press [On]. To turn it off, press [Shift] [On] (Off).

To adjust the brightness of the screen, press and hold [On] and then press either [+] or [−] repeatedly. Pressing [+] increases the brightness; pressing [−] decreases it.

Home View

Home view is the starting point for many calculations. Press [Settings] to display it. Home view has four sections (shown at the right). The title bar shows either the screen name or the name of the app that is currently selected—*Function* in the example at the right. It also shows the time, a battery power indicator, and a number of symbols that indicate various calculator settings. These are explained in the *User Guide*. The history displays a record of your past calculations. The entry line displays the object you are currently entering or modifying. The object could be a parameter, expression, list, matrix, line of programming code, etc. The menu buttons are options that are relevant to the current display. These options are selected by tapping the corresponding menu button. (Only a labeled button has a function.) Some menu buttons open a further menu. You close such a menu without making a selection from it by pressing [Esc].



Download from Www.Somanuals.com. All Manuals Search And Download.

Navigation

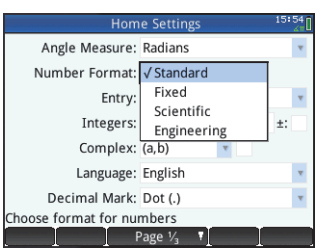
The HP Prime offers two modes of navigation: by touch and by keypress. In many cases, you can tap on an icon, field, menu, or object to select (or deselect) it. For example, you can open the Function app by tapping once on its icon in the Application Library. However, to open the Application Library, you will need to press a key: Apps Info. Selections can often be made either by tapping or by using the keys. For instance, as well as tapping an icon in the Application Library, you can press the cursor keys until the app you want to open is highlighted, and then press Enter. Sometimes both a touch and a key–touch combination is available. For example, you can deselect a toggle option either by tapping on it, or by using the cursor keys to move to the field and then tapping a touch button along the bottom of the screen (in this case √). Note that OK and Enter work identically, as do Cancel and Esc Clear.

You must use your *finger* to select an item by touch. Using a stylus or something similar will not work.

Touch gestures: In addition to selection by tapping, there are other touch-related operations available to you. How these gestures are interpreted varies from app to app, and from view to view within an app. For example, swiping the screen (by placing a finger on the screen and dragging it in the desired direction: right or left; up or down) will quickly move from page to page in a multi-page view like Plot Setup. But in the Plot view of most apps, swiping will scroll the view. Likewise, pinching (by placing a thumb and finger on the screen and moving them together or apart) will be interpreted differently by different apps. For example, in the Spreadsheet app, a horizontal pinch can be used to change the width of a column. In the Trig Explorer app, a vertical pinch can be used to change the amplitude of the sinusoid.

Home Settings

Many calculator settings are user-configurable, such as angle measure, number format, entry format, decimal mark etc. To view or change a setting, press Shift Settings (Settings). The **Home Settings** window appears. This window is an input form, that is, a window that provides one or more fields for you to enter data or select an option. You can use the cursor keys to move to a field you want to change, make your change, and press Enter.



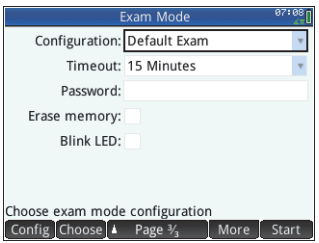
Download from Www.Somanuals.com. All Manuals Search And Download.

Alternatively, you can just tap the field or field label, and:

- if the field allows you to enter data of your choice, tap it, enter your data, and tap OK.
- if the field allows you to choose an item from a menu, tap on it twice and select the item you want.
- if the field is a toggle field—one that is either selected or not selected—tap once to select it and tap again to set the option to its alternate value.

Note that there are three pages of home settings. Tap Page 1/3 to display the second page. This page has settings for font size, calculator name, output display format, menu item format, time, date, color theme, and shading color.

The third page of settings will primarily be of interest to the supervisors of examinations who need to ensure that the calculator is used appropriately by students during an examination. Supervisors can disable certain functions of a student's calculator for a set period of time, with the disabling controlled by a password. This functionality is explained in detail in the *User Guide*.



To reset a field to its default value, move the cursor to that field and press Del. To reset all fields to their default values, press Shift Esc Clear (Clear).

Note that the reset options are available on all screens that show settings (not just the **Home Settings** screen). If settings are spread over more than one page, pressing Shift Esc Clear (Clear) resets only the settings on the page that is currently displayed.

To return to Home view, press Settings. Note that the CAS has its own settings (see page 10).

Entering and Editing Expressions

Methods

The home settings enable you to choose one of three entry methods:

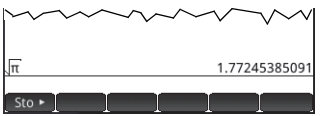
- Algebraic: entry is on a single line (as in x^2)
- Textbook: entry can be on several lines, as in a textbook (for example, x^2)
- RPN (that is, Reverse Polish Notation): inputs precede operators. Thus 5 Enter 4 + yields 9.

Download from Www.Somanuals.com. All Manuals Search And Download.

The examples in this guide will illustrate the textbook mode of entry. The order in which items are entered in textbook mode is the same in algebraic mode. Only the appearance of the entry is different. However, the order of entry in RPN mode is different. If you prefer to use RPN, consult the *User Guide*.

Example

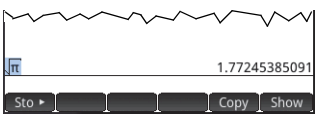
To calculate $\sqrt{\pi}$, enter Shift x^2 Shift 3 Enter



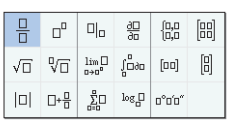
Notice that both √ and π are entered as a key-combination. They are shifted characters.

By default all results are displayed with 12 digits of accuracy. You can also evaluate expressions using the computer algebra system (CAS) directly, or by calling a CAS command from Home view. This provides symbolic rather than numeric results (see page 10).

Press ▲ twice to highlight the expression you entered. Note that two additional menu items appear: Copy and Show. The Copy command is described on page 7. The Show command is useful if a result is too tall to be seen in its entirety (for example, a many-rowed matrix). If you highlight the result and tap Show, it is displayed in textbook format in full-screen view. In full-screen view you can press ▲ and ▼ (as well as ▶ and ◀) to bring hidden parts of the result into view. Tap OK to return to the previous view.



Tip: a quick way to enter many types of mathematical expressions is to press Units. A palette of templates appears (shown at the right). You choose a template by tapping on it and then add the necessary parameters.

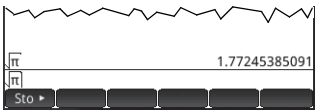


Entering Text

The common alphabetic characters (a–z and A–Z) can be entered from the keyboard. To enter an uppercase alphabetic character, first press ALPHA and then the key that has that character printed on it in orange. Thus to print F, enter ALPHA x^y. To enter a lowercase character, first press ALPHA Shift and then the key that has that character printed on it in orange. Thus to print f, enter ALPHA Shift x^y. There is a way to lock the keyboard so that all subsequent characters are uppercase without needing to be preceded by ALPHA. The keyboard can also be locked so that every subsequent alphabetic character is lowercase. This is explained in the *User Guide*.

Download from Www.Somanuals.com. All Manuals Search And Download.

Editing, Deleting, and Clearing

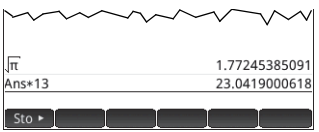


With an expression highlighted in history, tap Copy. The expression is copied to the entry line (as shown at the right). If you had meant to enter $\sqrt{3}$, you can edit the current expression by moving the cursor to the right of the π, pressing Del, and then typing 3.

To clear the entire entry line, press Esc Clear. To execute a new calculation, press Enter ≈.

The history section of Home view keeps a record of all your work. You can delete an item from history by selecting it and pressing Del. You can delete the entire history by pressing Shift Esc Clear, but be careful as there is no undo for this action.

Last Answer



Press Shift Ans (Ans) to retrieve your last answer for use in another calculation. `Ans` appears on the entry line. This is a shorthand for your last answer and it can be part of a new expression. You could now enter other components of a calculation—such as operators, number, variables, etc.—and create a new calculation.

Tip: you don't always need to first select `Ans` before it can be part of a new calculation. If you press any binary operator key to begin a new calculation, `Ans` is automatically added to the entry line as the first component of the new calculation. For example, to multiply the last answer by 13, you could enter Shift Ans × 13 Enter ≈. But the first two keystrokes are unnecessary. All you need to enter is × 13 Enter ≈.

Storing Values in Variables

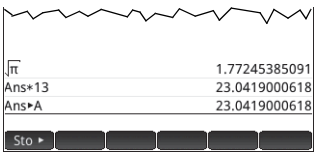
You can store a value in a variable (that is, assign a value to a variable). Then when you want to use that value in a calculation, you can refer to it by the variable's name. You can create your own variables, or you can take advantage of the built-in variables in Home view (named *A* to *Z* and θ) and in the CAS (named *a* to *z*, and a few others). CAS variables can be used in calculations in Home view, and Home variables can be used in calculations in the CAS. There are also built-in app variables and geometry variables. These can also be used in calculations. Consult the *User Guide* for details.

Download from Www.Somanuals.com. All Manuals Search And Download.

To store your last answer in Home variable A:

Sto ▸ ALPHA Vars Enter

Your stored value appears as shown to the right. If you then wanted to multiply your stored value by 5, you could enter: ALPHA Vars × 5 Enter.



You can also create your own variables (both in Home view and in CAS view). For example, entering 101 Sto ▸ ALPHA +/− ALPHA a b/c Enter assigns 101 to the variable ME, and a subsequent calculation such as `ME*3` will yield `303`.

Variables can also be created by adopting the following syntax: `[variable name]:=[object]`. For example, entering ALPHA 1 ALPHA) ALPHA 4 ALPHA − Shift . 55 Enter assigns 55 to the variable YOU. A subsequent calculation such as `YOU+ME` would yield `156`.

The HP Prime keeps a list of all the variables you create. You can see this list by pressing Vars, tapping User and choosing **User Variables**. A list of user-defined variables appears. To use a listed variable in a current calculation, just select it from the list. To delete a listed variable, use the cursor keys to highlight it and then press Del.

Copy and Paste

Copy-and-paste functionality is available. The copy options vary depending on where you are in the calculator. For example, if you are creating a matrix in the Matrix Editor, choosing copy (Shift View Copy) simply copies the value of the highlighted cell to the clipboard. You navigate to the target cell, press Shift Menu Paste to display the clipboard, and choose the entry you want to paste.

If you are working in the Program Editor or Note Editor, pressing Shift View Copy gives a number of copy options. The illustration at the right shows the menu items you see when you are in the Program Editor: mark where to begin a selection, mark where to end the selection, select the current line, select everything, cut what is selected, and copy what is selected.

In the Spreadsheet app, the paste functionality gives you a choice of what to paste: the copied value, the underlying formula, the format of what was copied, or the formula and its associated formatting.

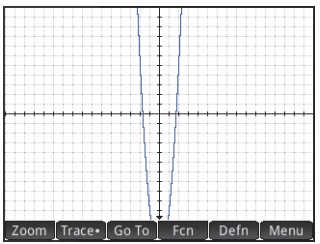
Download from Www.Somanuals.com. All Manuals Search And Download.

Understanding the User Interface

Menu Items

The bottom of the display contains a menu of up to six items. You choose an item by tapping it once with your finger.

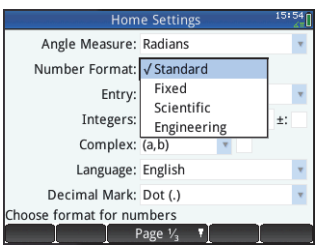
The menu items change depending on what screen is showing, or what item you last chose.



Choose Boxes

A choose box displays one item from a menu of items. To select an item other than the one showing, tap the box and then tap the item.

Pressing + (or −) will cycle forward (or backward) through the options.

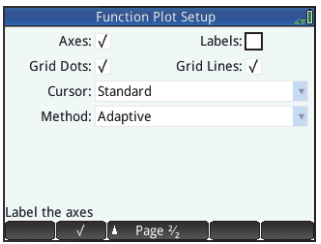


You can also use the cursor keys to highlight a choose box, tap Choose, use the cursor keys to select an item, and then press Enter.

Check Boxes

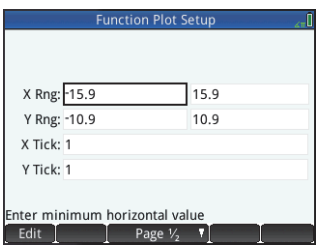
A check box enables you select or deselect a single option. To change a current selection, tap on it once to select it, and tap again to switch the value to its alternate setting.

You can also use the cursor keys to scroll to the check box and tap √.



Input Fields

To enter data into an empty input field, tap on the field and begin entering the data. What you enter appears on the entry line. If the input field already has data in it, tapping on it twice places the data on the entry line with the cursor at the end, ready for you to make your changes.



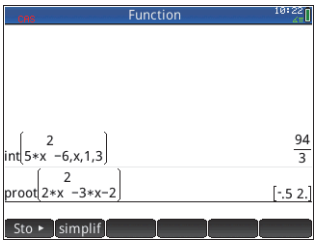
When you have finished entering or changing the data, tap OK or press Enter. You can also tap Cancel to reject the addition or alteration you have made.

Download from Www.Somanuals.com. All Manuals Search And Download.

Computer Algebra System (CAS)

The computer algebra system (CAS) enables you to perform symbolic calculations. By default, the CAS works in exact mode. On the other hand, non-CAS calculations, such as those performed in Home view or by an app, are numerical calculations and often approximations limited by the precision of the calculator (to 10^{-12} in the case of the HP Prime). For example, $\frac{1}{3}+\frac{2}{7}$ yields the approximate answer .619047619047 in Home view (with Standard numerical format), but $\frac{13}{21}$ in the CAS.

To open the CAS, press CAS Settings. The CAS view that appears is similar to the Home view. Previous CAS calculations are recorded in history and you can re-use an expression or result in exactly the same way: by selecting it and tapping Copy. Other general operations are exactly the same. For example, pressing Esc Clear clears the entry line, and pressing Shift Esc Clear clears the entire history.



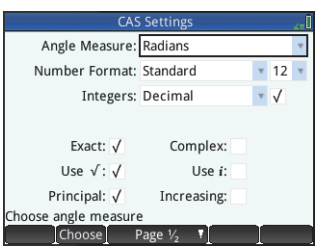
The menu buttons in CAS view are:

- Sto ▸: assigns an object to a variable (see page 7)
- simplif: applies common simplification rules to reduce an expression to its simplest form. For example, `simplify(e^(a + LN(b*e^c)))` yields `b*EXP(a)*EXP(c)`.
- Copy and Show work as they do in Home view (see pages 7 and 6 respectively)

The CAS offers many hundreds of functions, covering algebra, calculus, equation solving, polynomials, and more. You select a function from the **CAS** menu, one of the Toolbox menus (discussed in chapter 7).

CAS settings

Various settings allow you to configure how you would like the CAS to work. To display the **CAS Settings** screen, where these settings can be changed, press Shift CAS Settings. There are two pages of settings. The settings are explained in detail in the *User Guide*.



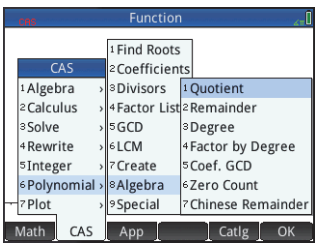
Download from Www.Somanuals.com. All Manuals Search And Download.

CAS calculations: Some examples

Suppose you want to find the quotient when $x^3 + 2x^2 + 3x + 4$ is divided by $-x + 2$.

1. Press CAS Settings to open the CAS.
2. Press Mem to display the Toolbox menus.
3. If the CAS menu is not open, tap CAS.

   Note that the CAS functions are grouped by category. When you select a category, the functions in that category appear in a sub-menu. Some items on that sub-menu may open a further sub-menu. In this example, we are dealing with polynomial division. Thus, at the top level, the `Polynomial` category is the one to open to find the appropriate CAS function. But division is also an algebraic operation. Thus you will find the quotient function on the `Algebra` sub-menu (as shown at the right).



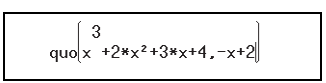
4. Select `Polynomial` > `Algebra` > `Quotient`.

   The function `quo()` appears on the entry line.

   You can also select a CAS function using the hot-key numbers assigned to each item on the CAS menus. Notice in the illustration above that `Polynomial` is item 6 on the top level menu, `Algebra` is item 8 on the first sub-menu, and `Quotient` is item 1 on the next sub-menu. To quickly select `Quotient` once the CAS menu is open, you could simply press 681 on the keyboard.

   You can also select a CAS function directly from the **Catlg** menu.

5. Enter the dividend and the divisor, separated by a comma. (Note that the *User Guide* and online help give the required syntax for each CAS function. Note too that variables must be entered in lowercase in the CAS.)

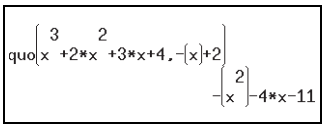


ALPHA Shift × x^y 3 ▶ + 2 ALPHA Shift × x^2 + 3 ALPHA Shift × + 4 , +/− ALPHA Shift × + 2

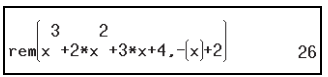
Download from Www.Somanuals.com. All Manuals Search And Download.

6. Press Enter to see the result: $-x^2 - 4x - 11$.

   Note that the input and result appear in history, where you can select them for re-use. We will now re-use the function to determine the *remainder* of the division.



7. Tap on the function and then tap Copy. The expression is copied to the entry line.
8. Using the cursor keys and the Del key, change `quo` to `rem`.
9. Press Enter to see the result: 26



CAS menu

By default, a CAS function is presented on a CAS menu using its descriptive name, not its command name. Thus the command name `gbasis` is presented as `Groebner Basis` and `proot` is presented as `Find Roots`. If you prefer the CAS menus to show the command names instead, deselect the **Menu Display** option on page 2 of the **Home Settings** screen (see page 4 above).

Using CAS in Home view

You can use a CAS function in Home view. Just select the function from the CAS menu while you are entering your expression. The `CAS.` prefix is added to your CAS function to remind you that this component of your expression will be evaluated by the CAS. You can also copy an item from CAS history to an expression you are entering in Home view. Press Menu Paste and select `Get from CAS`. The CAS view opens. Tap the item you want and it is copied directly to the cursor position in Home view. Likewise you can insert an item from Home view history into an expression you are entering in CAS view. Just press Menu Paste and select `Get from Home`. Home view opens. Tap the item you want and it is copied directly to the cursor position in CAS view.

Download from Www.Somanuals.com. All Manuals Search And Download.

2 HP Apps and their Views

HP Apps

Much of the functionality of the HP Prime is provided in packages called *HP apps*. The HP Prime comes with 18 HP apps: 12 dedicated to mathematical topics or tasks, three specialized Solvers, and three function Explorers. You launch an app by first pressing Apps Info (which displays the **Application Library** screen) and tapping on the icon of the app you want. The apps are outlined in tables 1, 2, and 3 below, and described in detail in chapters 3, 4, and 5 respectively.

Table 1: Primary apps

HP App Name	Purpose
Function	Define functions and explore graphs and tables of values
Advanced Graphing	Define and explore the graphs of symbolic open sentences in *x* and *y*
Geometry	Interact dynamically with geometric representations, change their magnitude, position, and orientation, and observe the resultant changes in their numerical properties
Spreadsheet	Create a spreadsheet using any of the calculator's functions
Statistics 1Var	Enter columns of data, conduct 1-variable statistical analyses, compute summary statistics, and explore statistical plots
Statistics 2Var	Enter columns of data, conduct 2-variable statistical analyses, compute summary statistics, and explore statistical plots
Inference	Compute and explore hypothesis tests and confidence intervals
Datastreamer	Collect real-world data using sensors and the HP StreamSmart 410
Solve	Solve an equation for one of its variables or solve a system of linear or non-linear equations
Parametric	Define parametric equations and explore their graphs and tables of values
Polar	Define polar equations and explore their graphs and tables of values
Sequence	Define sequences and explore graphs and tables of values

Download from Www.Somanuals.com. All Manuals Search And Download.

The three specialized Solvers—outlined in Table 2—are designed to help you solve problems of a specific type.

Table 2: HP Solver Apps

Solver App Name	Purpose
Finance	Solve time-value-of-money (TVM) and amortization problems
Linear Solver	Solve 2×2 and 3×3 systems of linear equations
Triangle Solver	Solve problems involving the lengths of sides, and the measures of angles, in triangles

Three apps are specifically designed to help you explore the relationships between the values of the parameters in a function and the shape of the graph of the function. See Table 3 below.

Table 3: HP Explorer Apps

Explorer App Name	Purpose
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

Data persistence

When you work with an app you enter data of one sort or another, such as definitions of functions, window settings, and preferences. The app records all this data and automatically saves it for you. If you leave the app and come back to it later, all that data is still there. In fact, you can save an instance of the app with a new name and keep the original version for another purpose. The new version, under the new name, contains all the data from the source app. (This is explained in chapter 6, "Creating Customized Apps" on page 52.)

If you don't want to retain the data stored with an app when you next open the app, you can reset the app to its default values and settings. With the **Application Library** displayed (Apps Info), use the cursor keys to highlight the app you want to reset, and then tap Reset. Confirm your intention to reset the app by tapping OK or pressing Enter.

Download from Www.Somanuals.com. All Manuals Search And Download.

Data sharing

Using the supplied USB cable, you can send an app from one HP Prime to another. It can be a built-in app or one you've customized. In fact, you can share with other HP Prime users many of the objects you create using your HP Prime, such as programs, notes, lists, and matrices.

Note that the connectors on the ends of the USB cable are slightly different. The micro-A connector has a rectangular end and the micro-B connector has a trapezoidal end. To share objects with another HP Prime, the micro-A connector must be inserted into the USB port on the *sending* calculator, with the micro-B connector inserted into the USB port on the *receiving* calculator.

Micro-A: sender Micro-B: receiver

App Views

Most HP apps have the same structure, based on the symbolic, graphic, and numeric representations of mathematical objects. These representations are called *views*, and they can be displayed by pressing Symb, Plot, and Num respectively. Each main view can be configured from an associated setup view. For example, pressing Shift Plot displays the **Plot Setup** view, where you can specify the range of values to be plotted, axis intervals, cursor appearance, etc.

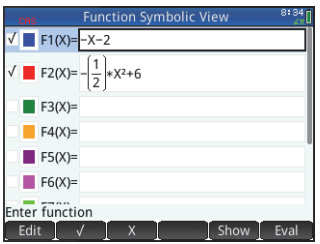
Note that an app remains selected until you select another one. Thus if you leave an app, do other work with the calculator and then press Symb, Plot, or Num, the previous data shown in these views are redisplayed. This includes expressions, plots, and values.

Download from Www.Somanuals.com. All Manuals Search And Download.

The six primary app views are illustrated below (using the Function app as an example).

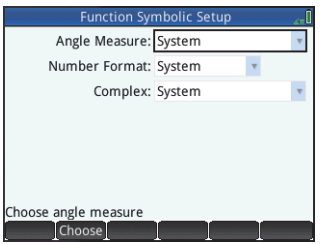
Symbolic View: Symb

This view is primarily used to define the mathematical objects—such as expressions and open sentences—that will be represented in the Plot and Numeric views. It is also used to specify the statistical analyses you want to undertake.



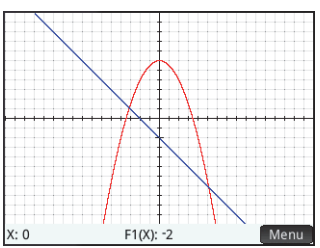
Symbolic Setup: Shift Symb (Settings)

This view enables you to change certain underlying settings for the app, such as the angle measure and number format. The settings made here will override the corresponding settings on the **Home Settings** window.



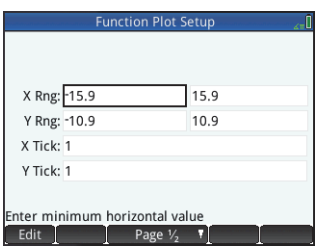
Plot View: Plot

Displays a graphical representation of the objects selected in Symbolic view. The graphical representations include graphs of functions, statistical plots, and confidence intervals. The Plot view offers numerous tools for exploring these graphs, such as zooming, tracing and determining critical values.



Plot Setup: Shift Plot (Settings)

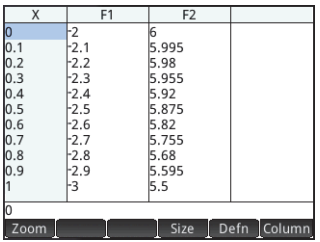
This view enables you to specify the range of values displayed in Plot view. (Note that zooming and panning will override any range settings.) It also enables you to set the appearance of Plot view (such as whether axes are displayed, the spacing of tickmarks, and the fineness of the plot).



Download from Www.Somanuals.com. All Manuals Search And Download.

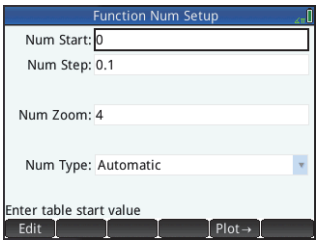
Numeric View: Num

This view displays a table of evaluations. It also enables you to enter specific values to be evaluated. In most apps, this view evaluates according to the definitions specified in the Symbolic view. It serves a different purpose in other apps, such as the statistics, spreadsheet, and geometry apps.



Numeric Setup: Shift Num (Settings)

This view enables you to set the appearance of the Numeric view (such as the starting number, increment, and type of table: automatic or build-your-own).



The Plot→ option makes the settings in Numeric view match those that currently apply in the Plot view.

Graphing Methods

The HP Prime gives you the option of choosing one of three graphing methods. These methods determine the fineness of the plot:

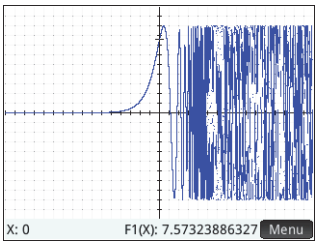
- *adaptive*: this gives very accurate results and is used by default.
- *fixed-step segments:* this method samples *x*-values, computes their corresponding *y*-values, and then plots and connects the points.
- *fixed-step dots*: this works like fixed-step segments method but does not connect the points.

You can change the current graphing method on page 2 of the Plot Setup view.

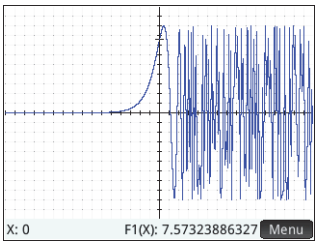
The three figures on page 18 illustrate the visual differences between these methods for the function $f(x)=9*\sin(e^x)$.

Download from Www.Somanuals.com. All Manuals Search And Download.

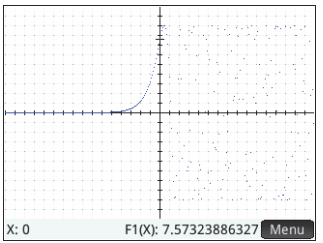
Adaptive



Fixed-step segments



Fixed-step dots



3 Primary Apps

This chapter briefly describe each primary app, summarizing its major views and the functionality available in each view. These apps—and the Solver and Explorer apps—are described in detail in the *User Guide*.

Note that all the primary variables entered in expressions and open sentences in these apps—*X*, *Y*, *T*, θ, *N*, etc.—must be entered as uppercase characters. User-defined variables can be incorporated, and these can be in any case: upper, lower, or mixed. Thus if you have created a variable called `Cost`, you could define a function as X^2+`Cost`. (For instructions on how to create variables, see "Storing Values in Variables" on page 7.)

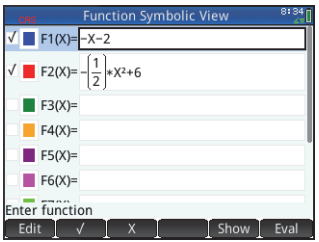
The Function, Advanced Graphing, Parametric, Polar, and Sequence Apps

The Function, Advanced Graphing, Parametric, Polar, and Sequence apps are very similar and can be described together. The Function app will be used as our sample app.

The Function app enables you to define functions in *x*, view their graphs, create evaluation tables, and find intersections, roots, slopes, extrema, etc. To open the Function app, press Apps and select **Function**.

Download from Www.Somanuals.com. All Manuals Search And Download.

Symbolic View In Symbolic view (Symb) you can enter up to ten symbolic definitions. For the Function app, these are functions of x. An example is $2x^2 - 3x + 4$.

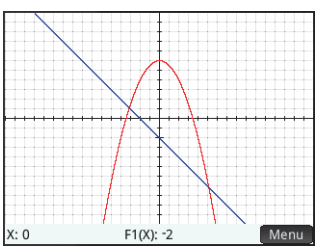


The functions with a checkmark against them will be plotted in Plot view and tabulated in Numeric view. Each definition also has a colored box to the left of it. This indicates the color of the function when it is plotted in Plot view. To change the color shown, tap twice on the box—once to select it and again to open the color picker—and choose a color.

The menu items are:

- Edit: activates the entry line for you to add a definition or edit the selected definition
- √: deselects or selects a function for graphing and table-building. (You can also tap a checkbox to deselect or select it.)
- X: enters an X
- Cancel: cancels the current addition or change
- OK: accepts the current addition or change
- Show: displays the selected function in textbook format in full-screen view (with vertical and horizontal scrolling enabled)
- Eval: resolves references when one function is defined in terms of another

Plot View Press Plot to display Plot view and see the graphs of the equations selected in Symbolic view. Plot view allows you to trace a plot, zoom in or out on a plot, view its symbolic definition, and find various critical values.

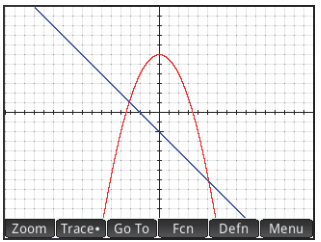


Tap Menu to display (or hide) the full menu for this view. The menu items are:

- Zoom: displays the Zoom menu, with options to zoom in or out. You can also quickly zoom in (and out) on the current cursor position by pressing + (and −).
- Trace•: toggles the tracing cursor off and on. With the tracing cursor on, you can press ▶ or ◀ to move a point along a plot. The coordinates of the point are displayed at the bottom of the screen. Press ▲ or ▼ to jump from one plot to another.

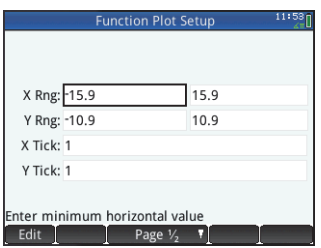
Download from Www.Somanuals.com. All Manuals Search And Download.

- Go To: displays an input box for you to specify an *x*-value for the tracing cursor. You can also just enter an *x*-value. This displays the **Go To** input box. Just tap OK to confirm the value. This option provides a quick way to evaluate a function for a particular *x*-value.



- Fcn: opens the Function menu, with options to find the:
  - Root
  - Intersection
  - Extremum
  - Slope and
  - Signed area.
- Defn: displays the symbolic definition of the currently selected function (that is, the definition entered in Symbolic view). If more than one function is plotted, press ▲ or ▼ to select another function.

Plot Setup View Press Shift Plot Setup to display the Plot Setup view. This view enables you to configure the appearance of the graphs in Plot view. There are two pages of options. The fields on the first page are:



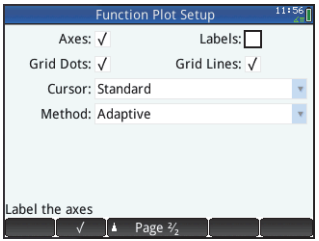
- **X Rng**: the horizontal graphing range (minium and maximum)
- **Y Rng**: the vertical graphing range (minium and maximum)
- **X Tick**: horizontal tick mark spacing
- **Y Tick**: vertical tick mark spacing

The menu items on the first page of this view are:

- Edit: makes the selected value editable. (You can also just tap the field twice.)
- Page ½: displays the second page of options

Download from Www.Somanuals.com. All Manuals Search And Download.

The second page of the Plot Setup view provides the following options:



- **Axes**: shows or hides the axes
- **Labels**: shows or hides the axis labels (that is, the values of **X Rng** and **Y Rng** at the end of the axes)
- **Grid Dots**: shows or hides grid dots
- **Grid Lines**: shows or hides grid lines
- **Cursor**: selects the standard, inverting, or blinking cursor
- **Method**: lets you choose between adaptive, fixed-step segments, and fixed-step dots methods of graphing (explained on page 17)

The menu items in this view—which vary according to where your cursor is—are:

- Choose: displays a menu of options. (Displayed only if the selected field offers a menu of options.)
- √: toggles the current setting on or off
- Page 2/2: returns you to the first page of the Plot Setup view

Numeric View Press Num Setup to display the Numeric view. This view displays in tabular form the values generated by the functions selected in Symbolic view. Choose any cell in the independent variable column (labeled *X* in the example at the right), enter any real value, and then press Enter or tap OK. All values are immediately recalculated. The menu items are:

X	F1	F2
0	-2	6
0.1	-2.1	5.995
0.2	-2.2	5.98
0.3	-2.3	5.955
0.4	-2.4	5.92
0.5	-2.5	5.875
0.6	-2.6	5.82
0.7	-2.7	5.755
0.8	-2.8	5.68
0.9	-2.9	5.595
1	-3	5.5

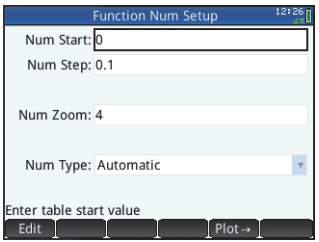
0

Zoom | Size | Defn | Column

- Zoom: zooms in or out on a highlighted row of the table. Note that in Numeric view, zooming does not affect the size of what is displayed. Instead, it changes the increment between consecutive *x*-values. Zooming in decreases the increment; zooming out increases the increment. The values in the row you zoom in or out on remain the same.
- Size: displays a menu for you to choose the small font, medium font, or large font
- Defn: displays the definition of the selected column
- Column: displays a menu for you to choose how many functions to display: 1,2, 3, or 4

Download from Www.Somanuals.com. All Manuals Search And Download.

Numeric Setup view Press Shift Num to display the Numeric Setup view. This view enables you to configure the appearance of the data displayed in Numeric view. The fields are:



- **Num Start**: the first value of *X* to show in the independent variable column of the table
- **Num Step**: the common difference (that is, increment) between consecutive *x*-values
- **Num Zoom**: the factor that will be used when zooming in or out on the table
- **Num Type**: choose how you want the table to be generated:
  - **Automatic**: based on your **Num Start** and **Num Step** values, the app generates the *x*-values and the corresponding function values
  - **BuildYourOwn**: you enter the *x*-values and the app generates the corresponding function values

The menu items in this view are:

- Edit: makes the selected value editable
- Plot→: sets **Num Start** and **Num Step** so that the table values match the settings in the Plot view. For example, **Num Start** is made the same as the minimum of the **X Rng** values.

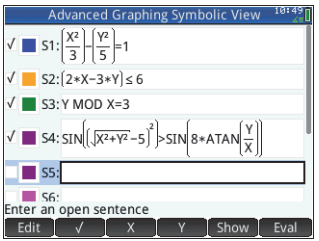
Advanced Graphing App

The Advanced Graphing app enables you to define and explore the graphs of symbolic open sentences in *x* and *y*. You can plot conic sections (for example, $x^2 + y^2 = 64$), two-variable inequalities (such as $2x - 3y \leq 6$), graphs that help you explore number theory, and much more. To open the Advanced Graphing app, press Apps and select **Advanced Graphing**. The app opens in Symbolic view. The information below describes the major differences between the Advanced Graphing app and the Function app (described on pages 18 to 22).

Download from Www.Somanuals.com. All Manuals Search And Download.

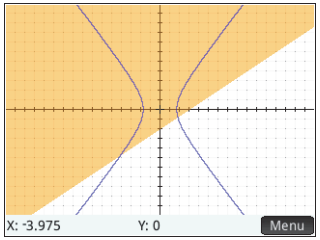
Symbolic view The Symbolic view of the Advanced Graphing app enables you to specify up to ten open sentences, each expressed in terms of *x*, *y*, both, or neither. Some examples are:

- $x^2/3 - y^2/5 = 1$
- $2x - 3y \le 6$
- y MOD $x = 3$
- $\sin((\sqrt{x^2 + y^2} - 5)^2) > \sin\left(8 \cdot \text{atan}\left(\frac{y}{x}\right)\right)$

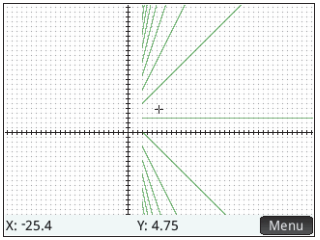


The menu items are the same as in the Symbolic view of the Function app, except that here there is a button for *Y* as well as for *X*. If you enter these variables manually, make sure that you enter them as uppercase characters: X and Y, not x and y.

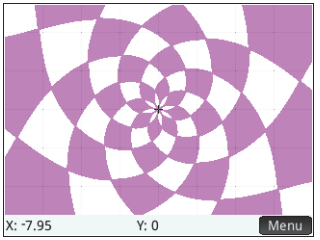
Plot view Press Plot Setup to display the Plot view and see the graphs of the open sentences selected in Symbolic view. The hyperbola in the first illustration below is S1 in Symbolic view (see above), and the shaded area indicates where the inequality defined in S2 evaluates to TRUE. The second illustration below shows S3, and the third shows S4. The graph of S4 has been zoomed in on to show some of its finer structure.



Definitions S1 and S2



Definition S3



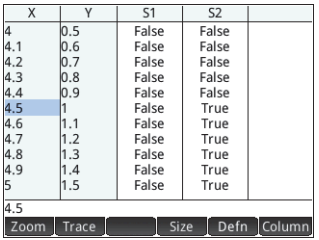
Definition S4 (with axes hidden)

The options available by tapping Menu are similar to those in the Function app. However, the Go To option lets you specify both the *X* and *Y* coordinates of the point you want to jump to. Further, the Trace• option opens a menu of trace options.

Plot Setup view Press Shift Plot Setup to display the Plot Setup view. This view enables you to configure the appearance of graphs. This view offers the same options as the Plot Setup view of the Function app (see page 13), except that there is no **Method** field.

Download from Www.Somanuals.com. All Manuals Search And Download.

Numeric view Press Num to display the Numeric view. For various combinations of *X* and *Y*, Numeric view shows whether the open sentence is satisfied. The illustration at the right shows that the open sentence $2x - 3y \leq 6$ (defined as S2 in Symbolic view: see above) is satisfied when $X = 4.5$ and $Y = 1$, but not when $X = 4.4$ and $Y = 0.9$. You can enter your own values in the X and Y columns.

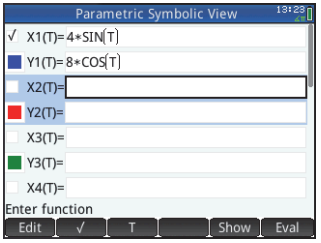


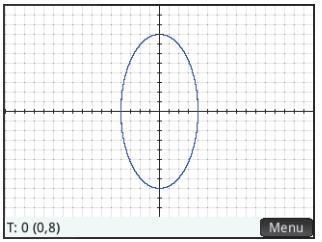
The menu items are the same as in the Function app, except that there is also Trace• menu. Options on this menu parallel those in the Plot view.

Parametric App

The Parametric app enables you to define parametric equations and explore their graphs and tables of values. It is similar in structure and functionality to the Function app. To open the Parametric app, press Apps and select **Parametric**. The app opens in Symbolic view. The information below describes the major differences between the Parametric app and the Function app (described on pages 18 to 22).

Symbolic View In Symbolic view (Symb) you can specify up to ten sets of parametric equations, each one defining *x(t)* and *y(t)* in terms of *t*. For example, $x = 4 \cdot \sin(t)$ and $y = 4 \cdot \cos(t)$ form a set of parametric equations. Note that the *t* must be entered as an uppercase character (T) in this app.



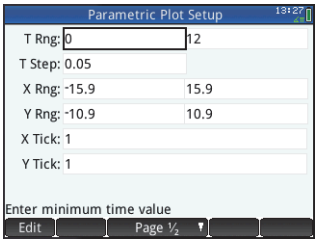


The menu items are the same as in the Symbolic view of the Function app, except that here T replaces X (and enters a *T* when tapped).

Plot View Press Plot to display the Plot view and see the graphs of the equations selected in Symbolic view. The functionality here is the same as in the Function Plot view, except that there are no **Fcn** functions.

Download from Www.Somanuals.com. All Manuals Search And Download.

Plot Setup View Press Shift Plot Setup to display the Plot Setup view. This view enables you to configure the appearance of the parametric graphs.

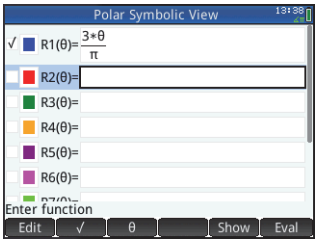


This view is similar to the Plot Setup view of the Function app (see page 20), except that it also contains **T Rng** and **T Step** fields. These fields enable you to specify the range and fineness of the *t*-values used to generate the (*x*,*y*) points for graphing.

Numeric view Press Num Setup to display Numeric view. This view is the same as you see in the Function app.

Polar App

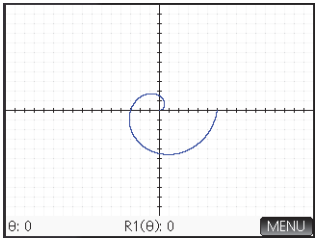
The Polar app enables you to define polar equations and explore their graphs and tables of values. It is similar in structure and functionality to the Function app. To open the Polar app, press Apps Info and select **Polar**. The app opens in Symbolic view. The information below describes the major differences between the Polar app and the Function app (described on pages 18 to 22).



Symbolic view The Symbolic view of the Polar app enables you to specify up to ten polar equations, each one defining *r*—the signed distance a point is from the origin: (0,0)—in terms of θ, the anti-clockwise angle a segment from the point to the origin makes with the polar axis. An example is $r = (3\theta)/\pi$.

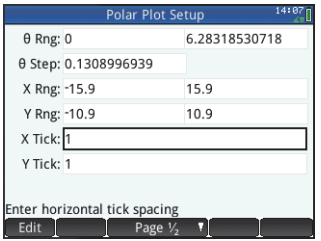
The menu items are the same as in the Function Symbolic view, except that here θ replaces X (and enters θ when tapped).

Plot view Press Plot Setup to display the Plot view and see the graphs of the equations selected in the Symbolic view. The functionality here is the same as in the Function Plot view, except that there are no **Fcn** functions.



Download from Www.Somanuals.com. All Manuals Search And Download.

Plot Setup view Press Shift Plot Setup to display the Plot Setup view. This view enables you to configure the appearance of the polar graphs. This view is similar to the Plot Setup view of the Function app (see page 20), except that it also contains **θ Rng** and **θ Step** fields. These fields enable you to specify the range and fineness of the θ-values used to generate the points for graphing.

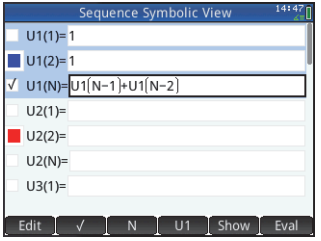


Numeric view Press Num Setup to display Numeric view. This view is the same as you see in the Function app.

Sequence App

The Sequence app enables you to define sequences. You can then view a stairstep or cobweb plot of a sequence, and explore a table of sequence values. To open the Sequence app, press Apps Info and select **Sequence**. The app opens in Symbolic view. The information below describes the major differences between the Sequence app and the Function app (described on pages 18 to 22).

Symbolic view The Symbolic view enables you to specify up to ten sequence definitions in *n*. Each sequence is defined either explicitly in terms of *n* or recursively. Note that *n* must be entered as an uppercase character (*N*) in this app.

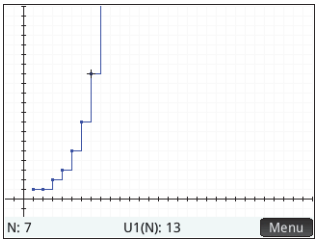


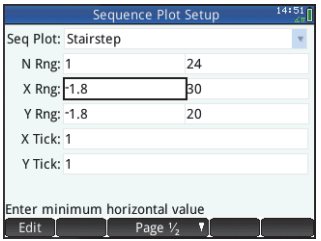
The menu items available depend on the equation you are specifying at the time:

- Edit: makes the selected definition editable
- √: deselects or selects a sequence for graphing and table-building
- N, U1, (N−1), (N−2): enters the corresponding text when tapped
- Cancel: cancels the current addition or change
- OK: accepts the current addition or change
- Show: displays the selected sequence in textbook format in full-screen view (with vertical and horizontal scrolling enabled)
- Eval: resolves references when one sequence is defined in terms of another

Download from Www.Somanuals.com. All Manuals Search And Download.

Plot view Press Plot Setup to display the Plot view and see the graphs of the sequences selected in Symbolic view. The functionality here is the same as in the Function Plot view, except that there are no **Fcn** functions.



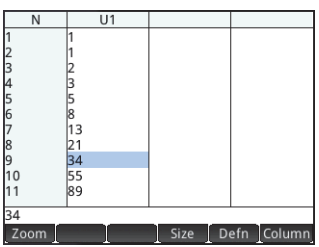


Plot Setup view Press Shift Plot Setup to display the Plot Setup view. This view enables you to configure the appearance of the sequence graphs.

This view offers the same options as the Plot Setup view of the Function app (see page page 20), but with two extra fields:

- **Seq Plot**: lets you choose between stairstep and cobweb plots
- **N Rng**: lets you set the range of terms to plot for each sequence

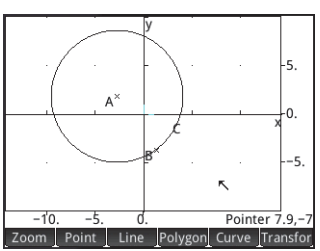
Also, there is no **Method** field.



Numeric view Press Num Setup to display Numeric view. This view is the same as you see in the Function app.

Geometry App

The Geometry app enables you to draw and explore geometric constructions. A geometric construction can be composed of any number of geometric objects, such as points, lines, polygons, curves, tangents, and so on. You can take measurements (such as areas and distances), manipulate objects, and note how measurements change. To open the Geometry app, press Apps Info and select **Geometry**. The app opens in Plot view.



Plot view In Plot view you can directly draw objects on the screen using various drawing tools. For example, to draw a circle, tap Curve and select `Circle`. Now tap where you want the center of the circle to be and press Enter. Next, tap a point that is to be on the circumference and press Enter. A circle is drawn with a center at the location of your first tap, and with a radius equal to the distance between your first and second tap.

Download from Www.Somanuals.com. All Manuals Search And Download.

Note that there are on-screen instructions to help you. For example, `Hit Center` means tap at the location where you want the center of your circle to be. Always confirm your intention by pressing Enter after tapping the screen, and press Esc Clear when you have finished drawing an object. This deactivates the drawing tool.

Each geometric object you create is given a name. This includes the points that make up a multi-point object. Thus if you create a polygon, the polygon is given a name, and so too is each point at each vertex and each segment. If you create a circle, the circle is given a name (C in the example above). So too is the center point (A) and the point on the circumference (B).

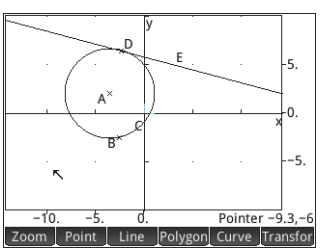
To select a point in Plot view, just press Enter. A list of all the points appears. Select the one you want to move, tap at the new location for it, and press Enter. A point can also be selected directly by tapping on it. (If the bottom-right of the screen shows the name of the point, you have accurately tapped the point; otherwise the pointer coordinates are shown, indicating that the point is not selected.)

If no point is selected, you can pan by dragging a finger across the screen: either up, down, left, or right. You can also use the cursor keys to pan provided that the cursor is at the edge of the display. You can zoom by pressing + Ans : or − Base :, or by tapping Zoom and choosing a zoom option from the zoom menu. The options are the same as you find in the Plot view of many apps: Zoom In, Zoom Out, Zoom Undo, Zoom Box, Autoscale, Zoom Integer, and Zoom Decimal.

The other menu items in Plot view are:

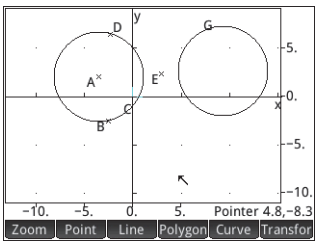
- Point: for adding, removing, and tracing various points. For example, if you select a segment, tap Point, choose `Midpoint` from the menu, and press Enter, a point is added to the segment equidistant from its two ends.
- Line: for adding various line-type objects, such as a segment, ray, line, vector, bisector, tangent, and so on. For example, to add a tangent to a circle:

  1. Tap Point, select `Point On`, and tap on the circle where you want the point of tangency to be.
  2. Now tap Line, select `More` and then `Tangent`.
  3. Tap the circle, press Enter, tap the point of tangency, and press Enter. A tangent is drawn to the circle through the point of tangency. Note that the point and the tangent are given names (`D` and `E` respectively in the example at the right).



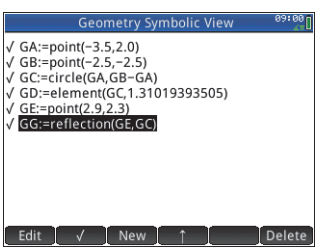
Download from Www.Somanuals.com. All Manuals Search And Download.

- Polygon: for adding various polygons, such as a triangle, quadrilateral, square, parallelogram, etc.
- Curve: for adding various curves (such as a circle, ellipse, or hyperbola) and defining various plots you want to add to Plot view (such as a function, parametric, or polar plot). For example, to draw $y = 1/x$, tap Curve, select `Plot` and `Function`. If there are function plots defined in the app, a menu appears for you to select one if you wish; otherwise select `New`. `plotfunc(` appears on the entry line. Enter 1 [÷] [ALPHA] [Shift] [×] [Enter]. The equation is plotted. (Note that in the Geometry app, built-in variables in expressions must be in lowercase. User-defined variables can be in any case.)
- Transfor: for transforming an object. The options available are translation, reflection, dilation, projection, inversion, and reciprocation. For example, to reflect an object, tap Transfor and select `Reflection`. Tap the object (point or straight object) that is to be the center and press [Enter]. Now tap on the object that is to be reflected and press [Enter]. The selected object is reflected over the center. (Notice, in the illustration at the right, how circle `G` is a reflection over point `E` of circle `C`.)



Symbolic view Every object—whether a point, segment, line, polygon, or curve—is given a name, and its definition is displayed in Symbolic view (Symb ↳Setup). The name is the name for it you see in Plot view prefixed by "G". Thus a point labeled `B` in Plot view is given the name `GB` in Symbolic view.

The G-prefixed name is a variable that can be referenced in Numeric view (see below) and in CAS calculations. Note from the illustration at the right that `GG` is the name of the variable that represents the circle just reflected. If you are working in the CAS and want to know what the area of that circle is, you could enter `area(GG)` and get the result.

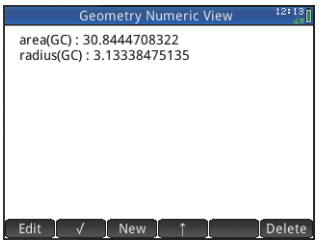


You can change the definition of an object by selecting it and tapping Edit. The object is modified accordingly in Plot view. For example, if you wanted to change the point of reflection in the circle example above, just select point `GE` and change its arguments. (The arguments are the coordinates of the point.)

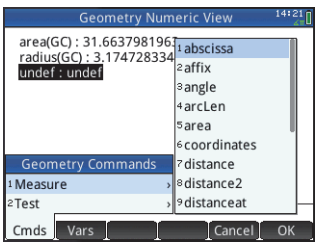
You can also create an object in Symbolic view. Tap New, define the object—for example, `point(4,6)`—and press [Enter]. The object is created and can be seen in Plot view. (Various commands are available from the Cmds menu that appears when you are adding or editing a definition.) You can also rename and delete objects in Symbolic view, and also deselect them. By deselecting an object you hide it in Plot view.

Download from Www.Somanuals.com. All Manuals Search And Download.

Numeric view Numeric view (Num) enables you to do calculations in the Geometry app. The results displayed are dynamic—if you manipulate an object in Plot view, any calculations in Numeric view that refer to that object are automatically updated to reflect the new properties of the manipulated object. To continue our example, if you go to Numeric view and tap New, you can enter an equation to calculate the area of the first circle we created. The syntax is the same as in the CAS: `area(GC)`. On pressing Enter, the area is calculated and displayed (as shown at the right). If you go back to Plot view and change the size of circle, you will find that, on returning to Numeric view, the area shown is now the area of the modified circle. Other calculations pertaining to that circle—such as the radius—will also have changed.



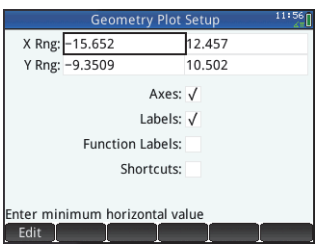
When you tap New or Edit in Numeric view, two additional menu items appear: Cmds and Vars. The Cmds menu gives you access to the syntax of numerous common geometric measurements and tests (to save you entering them by hand) and the Vars menu gives you a selectable list of all the geometric objects currently in Plot view.



Any calculation that you select—by highlighting it and pressing √—will also be displayed in Plot view. A highlighted calculation can also be edited, deleted, and moved up and down the calculation list. (The latter option is useful if you have calculations that are dependent on other calculations.)

Plot Setup view In addition to the **X Rng**, **Y Rng**, **Axes** and **Labels** options common to a number of plotting apps, the Plot Setup view in the Geometry app offers:

- **Function Labels**: select this option to have the definition of any plot appear beside the plot in Plot view
- **Shortcuts**: select this option to enable keyboard shortcuts. For example, $\sqrt{x^2}$ selects the line-drawing tool, $x^3 \div$ selects the triangle drawing tool, and Matrix 4 reverses your last operation (acting as an Undo key). All the shortcuts are listed in the *User Guide*.



Download from Www.Somanuals.com. All Manuals Search And Download.

Spreadsheet App

The spreadsheet app provides a grid of cells for you to enter content (such as numbers, text, expressions, and so on) and to perform certain operations on what you enter. To open the Spreadsheet app, press Apps and select **Spreadsheet**. The app opens in Numeric view. (There is no Plot or Symbolic view.)

Navigation, selection and gestures

You can move about a spreadsheet by using the cursor keys, by swiping, or by tapping Go To and specifying the cell you want to move to. You select a cell simply by moving to it. You can also select an entire column—by tapping the column letter—and select an entire row (by tapping the row number). You can even select the entire spreadsheet: just tap on the unnumbered cell at the top-left corner of the spreadsheet. (It has the HP logo in it.)

A block of cells can be selected by pressing down on a cell that will be a corner cell of the selection and, after a second, dragging your finger to the diagonally opposite cell. You can also select a block of cells by moving to a corner cell, tapping Select and using the cursor keys to move to the diagonally opposite cell. Tapping on Sel• or another cell deselects the block.

Entering content

A cell can contain any valid calculator object: a real number (3.14), a complex number ($a+ib$), an integer (#1Ah), a list ({1, 2}), a matrix or vector([1, 2]), a string ("text"), a unit (2_m) or an expression (that is, a formula). Move to the cell you want to add content to and start entering the content as you would in Home view. Press Enter when you have finished. You can also enter content into a number of cells with a single entry. Just select the cells, enter the content—for example, `=Row*3`—and press Enter.

What you enter on the entry line is evaluated as soon as you press Enter, with the result placed in the cell or cells. However, if you want to retain the underlying formula, precede it with Shift ÷. For example, suppose that want to add cell A1 (which contains 7) to cell B2 (which contains 12). Entering A1 + B2 Enter in, say, A4 yields19, as does entering Shift ÷ A1 + B2 in A5. However, if the value in A1 (or B2) changes, the value in A5 changes but not the value in A4. This is because the expression (or formula) was retained in A5. To see if a cell contains just the value shown in it or also an underlying formula that generates the value, move your cursor to the cell. The entry line shows a formula if there is one.

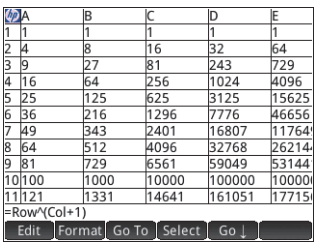
Download from Www.Somanuals.com. All Manuals Search And Download.

A single formula can add content to every cell in a column or row. For example, move to `C` (the heading cell for column C), enter Shift [÷] `SIN(Row)` and press Enter. Each cell in the column is populated with the sine of the cell's row number. A similar process enables you to populate every cell in a row with the same formula. You can also add a formula once and have it apply to *every* cell in the spreadsheet. You do this by placing the formula in the cell at the top left (the cell with the HP logo in it). To see how this works, suppose you want to generate a table of powers (squares, cubes, and so on) starting with the squares:

1. Tap on the cell with the HP logo in it (at the top left corner). Alternatively you can use the cursor keys to move to that cell (just as you can to select a column or row heading).
2. On the entry line type Shift [÷] Row [x^y] [( )] Col [+] 1

   Note that `Row` and `Col` are built-in variables. They are placeholders for the row number and column number of the cell that has a formula containing them.
3. Tap OK or Press Enter.

   Note that each column gives the *n*th power of the row number starting with the squares. Thus 9^5 is 59,049.



Cell references and naming

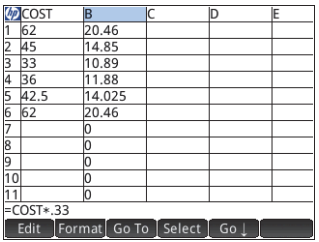
You can refer to the value of a cell in formulas as if it were a variable. A cell is referenced by its column and row coordinates, and references can be absolute or relative. An absolute reference is written as CR (where *C* is the column number and *R* the row number). Thus B7 is an absolute reference. In a formula it will always refer to the data in cell B7 wherever that formula, or a copy of it, is placed. On the other hand, B7 is a relative reference. It is based on the *relative position* of cells. Thus a formula in, say, B8 that references B7 will reference C7 instead of B7 if it is copied to C8.

Ranges of cells can also be specified, as in C6:E12, as can entire columns (E:E) or entire rows ($3:$5). Note that the alphabetic component of column names can be uppercase or lowercase except for columns g, l, m, and z. These must be in lowercase *if not preceded by $*. Thus cell B1 can be referred to as `B1`, `b1`, `$B$1` or `$b$1` whereas M1 can only be referred to as `m1`, `$m$1`, `or $M$1`. (G, L, M, and Z are names reserved for graphic objects, lists, matrices, and complex numbers.)

Download from Www.Somanuals.com. All Manuals Search And Download.

Cells, rows, and columns can be named. To name a cell, row, or column, go the cell, row header, or column header, enter a name and tap Name. The name can then be used in a formula. Consider the following example:

1. Select cell A (that is the header cell for column A).
2. Enter `COST` and tap Name.
3. Select cell B (that is the header cell for column B).
4. Enter Shift ÷ `COST*0.33` and tap OK.
5. Enter some values in column A and observe the calculated results in column B.



Copy and paste

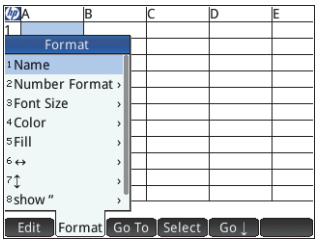
Select one or more cells and press Shift View Copy (Copy). Move to the desired location and press (Menu Paste (Paste). You can choose to paste either the values, formulas, formats (or the formula and associated format).

Menu items

- Edit: activates the entry line for you to enter or edit whatever is selected
- Name: names whatever is selected. This item appears only when you start entering content or after tapping Edit.
- CAS: forces what you are about to enter to be evaluated by the CAS. For example, Shift ÷ 23 $\frac{x}{T}$ 2 yields 11.5 normally, but if you precede the calculation by tapping CAS, the result displayed is 23/2. You can revert to non-CAS evaluation by tapping CAS•. These menu items appear only when you start entering content or after tapping Edit.
- Go To: displays an input form for you to specify the cell you want to jump to
- Select: sets the calculator into select mode so that you can easily select a block of cells using the cursor keys. It changes to Sel• to enable you to deselect cells. (You can also press, hold and drag to select a block of cells.)
- Go → or Go ↓: sets the direction the cursor moves after content has been entered in a cell
- Show: displays the contents of the selected cell in full-screen view (and in textbook format)

Download from Www.Somanuals.com. All Manuals Search And Download.

- Sort: displays a menu for you to choose a column to sort (with a further option to sort in ascending or descending order). It appears only after you have selected the cells to sort.
- Format: displays a menu of formatting options for the selected cell, row, column, or entire spreadsheet. The formatting options are:



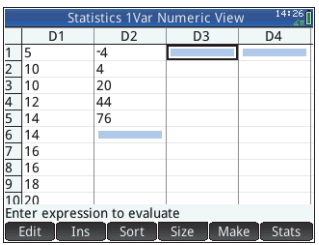
  - **Name**: displays an input form for you to give a name to whatever is selected
  - **Number Format**: Auto, Standard, Fixed, Scientific, or Engineering
  - **Font Size**: Auto or from 10 to 22 point
  - **Color**: color for the content (text, number, etc.) in the selected cells; the gray-dotted option represents Auto
  - **Fill**: background color that fills the selected cells; the gray-dotted option represents Auto
  - **Align** ↔: horizontal alignment—Auto, Left, Center, Right
  - **Align** ↕: vertical alignment—Auto, Top, Center, Bottom
  - **Column** ↔: displays an input form for you to specify the required width of the selected columns; only available if you have selected the entire spreadsheet or one or more entire columns
  - **Row** ↕: displays an input form for you to specify the required height of the selected rows; only available if you have selected the entire spreadsheet or one or more entire rows
  - **show "**: show quote marks around strings in the body of the spreadsheet—Auto, Yes, No
  - **Textbook**: display formulas in textbook format—Auto, Yes, No
  - **Caching**: turn this option on to speed up calculations in spreadsheets with many formulas; only available if you have selected the entire spreadsheet

Download from Www.Somanuals.com. All Manuals Search And Download.

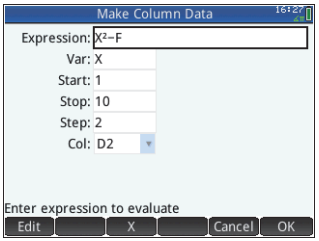
Statistics 1Var App

The Statistics 1Var app is designed for the study of univariate statistics. It provides tools for entering numeric data, calculating 1-variable summary statistics, and plotting 1-variable statistical graphs. The app can exchange data with the Statistics 2Var app and the Spreadsheet app (explained in the *User Guide*). It can also receive data from the DataStreamer app and pass summary statistics directly to the Inference app (where you can calculate confidence intervals and test hypotheses). To open the Statistics 1 Var app, press Apps and select **Statistics 1Var**. The app opens in Numeric view.

Numeric view The Numeric view provides a table with up to ten columns for data, named `D1` through `D9` and `D0`. The menu items are:



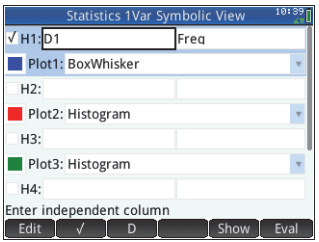
- Edit: activates the entry line for you to add a value or change the selected value
- Ins: inserts a new row above the currently highlighted cell
- Sort: sorts the current column; you can choose ascending or descending order
- Size: displays a menu for you to choose the small font, medium font, or large font
- Make: displays an input form for you to enter a formula to generate a list of values for a specified column. In the example at the right, 5 data-points will be placed in column D2. They will be generated by the expression $X^2 - F$ where X comes from the set {1, 3, 5, 7, 9}. These are the values between 1 and 10 that differ by 2. *F* is whatever value has been assigned to it elsewhere (such as in Home view). If *F* happened to be 5, column D2 is populated with {–4, 4, 20, 44, 76}.



- Stats: provides summary statistics for the currently selected analyses defined in Symbolic view. The statistics provided are *n*, Min, Q1, Med, Q3, Max, ΣX, ΣX^2, Min, $\bar{x}$, sX, σX, and $serrX$.

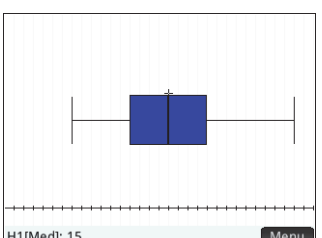
Download from Www.Somanuals.com. All Manuals Search And Download.

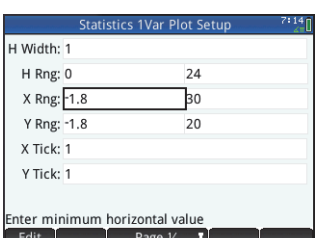
Symbolic view Press Symb to display the Symbolic view. You can define up to five 1-variable analyses (H1–H5), choosing for each analysis a data column and, optionally, a frequency column. For the data column, you can enter either the name of a column (`D0`–`D9`) or a mathematical expression involving the name of a column (e.g. `D1*9.8`). There is also a **Plot** field for each analysis. This is where you choose the graphical representation most fitting for your purposes. The menu items, which change according to the field selected, are:



- Edit: activates the entry line for you to add a value or change the selected value
- Choose: displays a menu for you to select a plot type: histogram, box and whisker, normal probability, line, bar, or pareto
- √: toggles between making an analysis active or inactive
- D: enters a `D` when tapped
- Show: displays the selected equation in textbook format and in full-screen view (with vertical and horizontal scrolling enabled)
- Eval: resolves references when one equation is defined in terms of another

Plot view Press Plot to display the Plot view. This view displays the selected 1-variable statistical plots for each selected analysis. The menu is similar to the Function Plot view, with options for zooming and tracing (but without a **Go To** or **Fcn** option).





Plot Setup view Press Shift Plot to display the Plot Setup view. This view enables you to configure the appearance of statistical plots. This view offers the same options as the Plot Setup view of the Function app (see page 20), but with two extra fields:

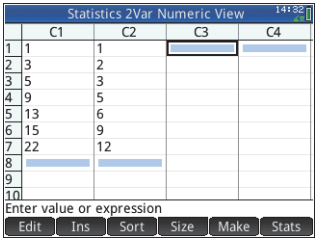
- **H Width:** to specify the width of a histogram bar
- **H Rng:** to specify the range of data to be plotted

Also, there is no **Method** field.

Download from Www.Somanuals.com. All Manuals Search And Download.

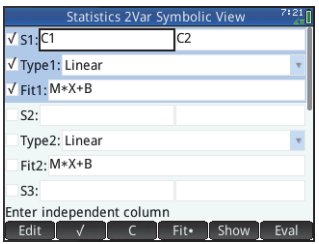
Statistics 2Var App

The Statistics 2Var app is designed for the study of bivariate statistics. It provides tools for entering numerical data, calculating 2-variable summary statistics, and creating 2-variable statistical plots. The app can exchange data with the Statistics 1Var app and the Spreadsheet app (explained in the *User Guide*). It can also receive data from the DataStreamer app and pass summary statistics directly to the Inference app (where you can calculate confidence intervals and test hypotheses). To open the Statistics 2Var app, press Apps and select **Statistics 2Var**. The app opens in Numeric view.



Numeric view The Numeric view provides a table with up to ten columns for data, named `C1` through `C9` and `C0`. The menu items are the same as those in the Statistics 1Var Numeric view (see page 35).

Symbolic view Press Symb to display the Symbolic view. You can define up to five 2-variable analyses, named S1–S5, by specifying two data columns and a fit type for each analysis. The menu items, which change according to the field selected, are:

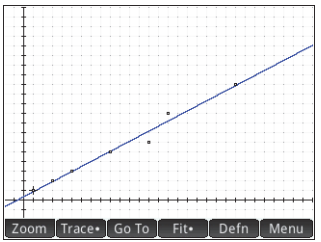


- Edit: to specify a data column, or, when a **Fit***n* field is selected, to enter or edit a fit equation. If you enter your own fit equation, the corresponding **Type***n* field automatically changes to **User Defined**.
- Choose: displays a menu for you to select a type of fit: linear, logarithmic, exponential, etc.; visible only when a **Type***n* field is selected
- √: toggles between making an analysis active or inactive
- C: enters a `C` when tapped; visible only when an **S***n* field is selected
- X: enters an `X` when tapped; visible only when a **Fit***n* field is selected
- Fit•: specifies whether a graph of the type chosen will be plotted when you display Plot view. If this is not selected, only the data points are plotted.
- Show: displays the selection in textbook format in full-screen view; visible only when an **S***n* or **Fit***n* field is selected
- Eval: evaluates the variables in whatever is selected; visible only when an **S***n* or **Fit***n* field is selected

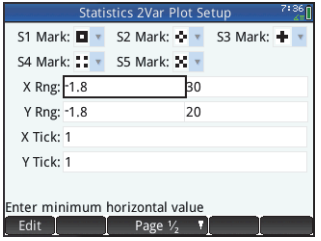
Download from Www.Somanuals.com. All Manuals Search And Download.

When specifying dependent and independent columns in the **Sn** fields, you can enter column names (e.g. `C1`) or mathematical expressions in terms of column names (e.g. `2*C1`).

Plot view Press Plot Setup to display the Plot view. This view displays the scatter plot for each selected analysis. Tap Menu to display (or hide) the full menu for this view. The menu items are:



- Zoom: displays the Zoom menu, with options to zoom in or out. You can also press + to zoom in and − to zoom out.
- Trace•: toggles the tracing cursor off and on. With the tracing cursor on, you can press ▶ or ◀ to move from data point to data point. The values of each point are displayed at the bottom of the screen. If there is a fit equation displayed, you can press ▲ or ▼ to trace the equation instead. Press ▶ or ◀ to move along the equation. Values of the dependent variable, as predicted by the fit equation, are displayed at the bottom of the screen.
- Go To: takes the tracing cursor to the point you specify (or to the closest point)
- Fit•: shows (or hides) the graph of the fit equation
- Defn: displays the columns used to define the graph or, if the tracing cursor is on a point on the graph of the fit equation, the definition of the fit equation. You can also see the fit equation by returning to Symbolic view and looking at the corresponding **Fit***n* field.



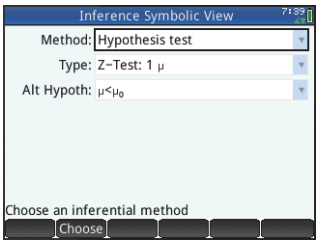
Plot Setup view Press Shift Plot Setup to display page 1 of the Statistics 2Var Plot Setup view. This view is similar to page 1 of the Statistics 1Var Plot Setup view, except that the **H Width** and **H Rng** fields have been replaced with fields that enable you too choose different data-point marks for each scatter plot.

Page 2 of this view is identical to page 2 of the Function Plot Setup view (see page 20) except for the addition of a **Connect** field. If this field is selected, the data points are connected by straight segments. Note that these segments do not constitute a fit.

Download from Www.Somanuals.com. All Manuals Search And Download.

Inference App

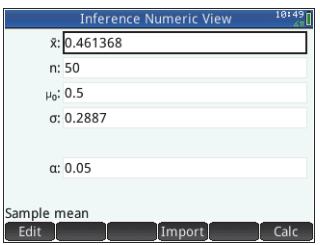
The Inference app provides tools for inferential statistics, enabling you to specify confidence intervals and test hypotheses. Summary statistics from any column in the Numeric view of the Statistics 1Var or Statistics 2Var app can be imported into it. To open the Inference app, press Apps and select **Inference**. The app opens in Symbolic view.



Symbolic view This view provides fields for you to define a confidence interval or hypothesis test. The fields are:

- **Method**: choose hypothesis test or confidence interval
- **Type**: choose from a variety of Z- and T-distributions
- **Alt Hypoth**: choose one of three alternative hypotheses (for hypothesis tests only)

Numeric view Press Num to display the Numeric view. This view contains fields for you to enter sample statistics (e.g. sample mean $\bar{x}$ and sample size *n*), population parameters (e.g. null hypothesis mean μ_0 and standard deviation σ), and the significance level α. The menu items are:



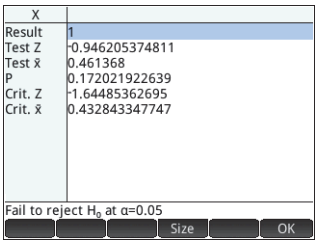
- Edit: moves the cursor to the entry line where you can add or change a value
- Import: enables you to import statistics (such as $\bar{x}$, *n*, etc.) from any column in the Statistics 1Var or Statistics 2Var app (or any app based on those apps)
- Calc: displays the interval or test results

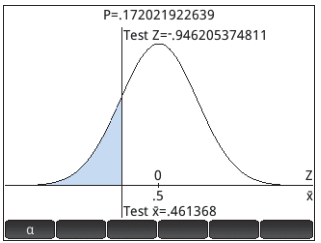
Download from Www.Somanuals.com. All Manuals Search And Download.

Tap Calc to see the confidence interval or hypothesis test results and OK to return to the Numeric view.

Press Plot Setup to display the Plot view. This view displays the test results or confidence interval graphically.

Tap α to display the critical score against the test score. Press ▼ or ▲ to decrease or increase the α-level.



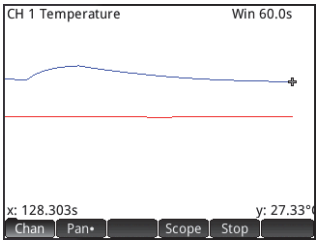


DataStreamer App

The DataStreamer app enables you to collect real-world data from scientific sensors. It works with the HP StreamSmart 410 data streamer and many of the scientific sensors available from Fourier Systems™. You could, for example, work with sensors that detect temperature, pressure, distance, and the like. The app recognizes the sensors automatically and sets up data streaming, displaying the incoming data graphically as a stream in real time. See the *HP StreamSmart 410 User Guide* for complete details.

First connect the HP StreamSmart 410 to the HP Prime and then connect between one and four sensors to the HP Prime. Open the DataStreamer app by pressing Apps Info and selecting **DataStreamer**. The app searches for any sensors that are connected to the calculator and, when it finds them, prompts you to start the data capture by tapping Start.

The DataStreamer app starts in Plot view. This view displays the data from 1 to 4 sensors graphically as a live time graph called a data stream. Each line in the view represents data from one sensor. The menu items are:



- Chan: each sensor is allocated a channel. Tap this button to switch the focus to another channel. You can also press 1, 2, 3, or 4 to switch focus to each of these channels. The information displayed at the bottom of the screen is related to the currently selected channel. In the example at the right, the Temperature channel is selected. This channel is taking information from a temperature sensor in a beaker and that information is showing that 128.303 seconds after the start of the stream, the temperature in the beaker had reached 27.33°.

Download from Www.Somanuals.com. All Manuals Search And Download.

- Pan• or Zoom: toggles the action of the cursor keys between pan (that is, scroll) and zoom. Zoom in or out horizontally on the streams even while data is streaming, effectively speeding them up or slowing them down. Scroll vertically to separate or center the streams.
- Scope: turns oscilloscope mode on and off
- Start or Stop: starts or stops data streaming

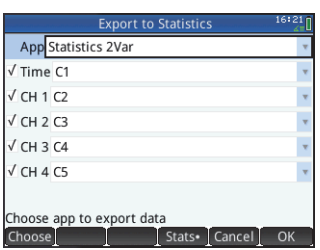
When you tap Stop three more menu items appear:

- Trace•: toggles tracing on and off for the current data stream. With tracing on, you can press ◀ or ▶ to move the trace cursor along the currently selected channel. The values at the bottom of the screen change as the cursor moves.
- Export: opens a menu for selecting the data you want to export to the Statistics 1Var or Statistics 2 Var apps
- ▸: shows further options. You can, for example, place a mark at the current tracer position, swap the position of the mark and the tracer, jump to a specific time along the current stream, add the current tracer point to your data set, and display the **Export to Statistics** screen (see below).

On pressing Export further menu items appear:

- [: sets the left-most edge of the data you want to study. All data to the left is cropped.
-]: set the right-most edge of the data you want to study. All data to the right is cropped.
- ▸: shows further options. You can, for example, choose to see only a subset of samples, and to add or delete data. There is also an OK button for you to display the **Export to Statistics** screen (see below).

On the **Export to Statistics** screen, select the statistics app you want to use to analyze the data—1Var or 2Var—and then select the channels whose statistics you want to analyze (and time, if necessary). For each channel and the timestamp, you can select the column in the app into which you want that data copied. When you tap OK, the Numeric view of the selected statistics app opens. You can now continue your analysis of the captured data in that app.



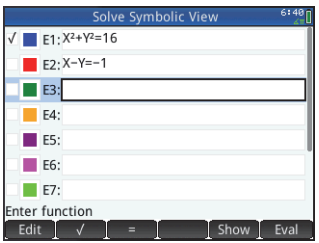
The statistics apps are described on page 35 (1Var) and page 37 (2Var).

Download from Www.Somanuals.com. All Manuals Search And Download.

Solve App

The Solve app enables you to define up to ten equations, each with as many variables as you like. You can solve a single equation for one of its variables, based on a seed value. You can also solve a system of equations (linear or non-linear), again using seed values. To open the Solve app, press Apps Info and select **Solve**. The app opens in Symbolic view.

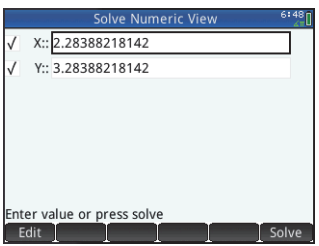
Symbolic view The Symbolic view enables you to specify the equations, each with as many variables as you like. The variables must all be uppercase.



The menu items are:

- Edit: moves the cursor to the entry line where you can add a new equation or change a selected equation
- √: selects or deselects an equation for solving
- =: enters the equals sign
- Show: displays the selected equation in textbook format in full-screen view (with vertical and horizontal scrolling enabled)
- Eval: resolves references when one equation is defined in terms of another

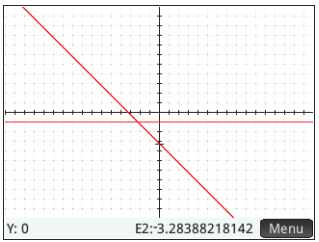
Numeric view Press Num Setup to display the Numeric view. In the Solve app, the Numeric view is not a table of evaluations (as it is in the Function app). Instead, it is an input form for you to enter values for the known variables. You then move the cursor to the unknown variable and tap Solve. You can enter a seed value for the unknown variable in case there are multiple solutions. The menu items are:



- Edit: moves the cursor to the entry line where you can add or change a value
- Info: supplies information about the nature of the solution found; it only appears if you are solving one equation
- Solve: calculates the highlighted variable based on the values of the other variables

Download from Www.Somanuals.com. All Manuals Search And Download.

Plot view You can plot only one equation at a time in the Solve app, so make sure that only one equation is selected in Symbolic view. To display Plot view, press Plot Setup. The left side and the right side of the selected equation are plotted as separate graphs. The variable that was highlighted in Numeric view is taken as the independent variable.



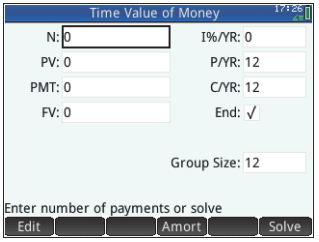
The Plot View menu items, and the Plot Setup view, are the same as in the Function app. (See page 19.) However, there is no **Fcn** functionality in the Solve app.

4 Solver Apps

The HP Prime has three Solver apps, each designed to solve problems of a specific type: a Finance app, a Linear Solver app, and a Triangle Solver app. The Finance app solves time-value-of-money (TVM) and amortization problems, the Linear Solver finds solutions to systems of linear equations, and the Triangle Solver finds measures of angles and lengths of sides in problems involving triangles.

Finance App

The Finance App solves time-value-of-money (TVM) and amortization problems. To open the Finance app, press Apps Info and select **Finance**. The Finance app has two pages: one for TVM problems and the other for amortization. The amortization page uses values from the TVM page.



The TVM page enables you solve TVM problems. You enter as much data as you have and then highlight a variable whose value you want to calculate. The fields are:

- **N**: total number of periods or payments
- **I%/YR**: the nominal annual interest rate
- **PV**: present value at the start of the cash flow
- **P/YR**: the number of payments made in a year
- **PMT**: the payment due per period

Download from Www.Somanuals.com. All Manuals Search And Download.

- **C/YR**: the number of compounding periods per year
- **FV**: the value at the end of the cash flow
- **End**: whether payment is made at the beginning or end of each period
- **Group Size**: number of payments per group (for an amortization schedule)

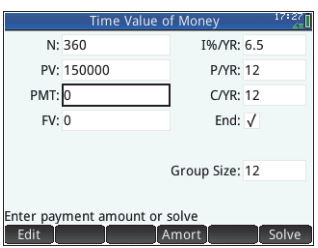
The menu items are:

- Edit: moves the cursor to the entry line where you can add or change a value
- Amort: displays the amortization page (see page 45)
- Solve: calculates the selected variable based on the other variables

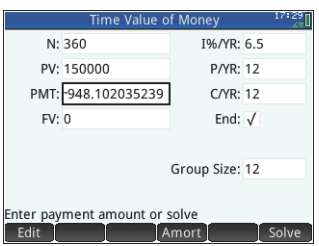
Example 1

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. Thus a net $150,000 is financed. How much is the required monthly payment? Assume payments start at the end of the first period.

You enter the data as shown in the first figure at the right.



Example 1



Solution

Solution

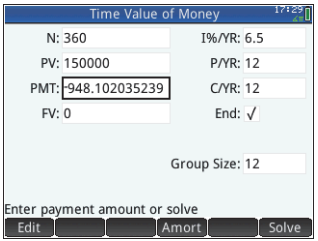
Highlight the **PMT** field (as it is the payment value we want to calculate). Tap Solve. The payment value is calculated. As shown in the second figure at the right, you will need to make monthly payments of $948.10. (Negative values indicate payments you make, while positive values indicate payments made to you.)

Download from Www.Somanuals.com. All Manuals Search And Download.

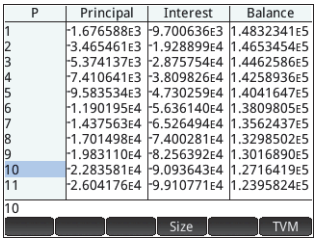
Example 2

To continue the previous 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?

To solve this problem you need to display the amortization schedule for the loan. Tap Amort. The amortization schedule appears as a table, with columns for payment group (P), the principal paid during the group, the interest paid during the group, and the balance remaining at the end of the group. The menu items are:



Example 2



Solution

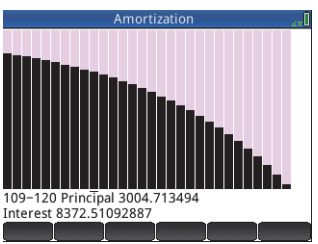
Size: displays a menu for you to choose to a font size: small, medium, or large

TVM: returns to the TVM page

Solution

To find the balloon payment due after 10 years of payments, scroll down the P column until you come to the row where P = 10. There you will see that you will have repaid $22,835.81 in principal, as well as paying $90,936.43 in interest. The fourth column shows a balance of $127,164.19 due after 10 years. That is the size of the required balloon payment.

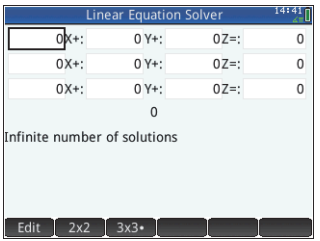
Press Plot Setup to see a graphical representation of the amortization table. Press ▶ to step though each payment group and see, at the bottom of the screen, the principal and interest paid in each group.



Download from Www.Somanuals.com. All Manuals Search And Download.

Linear Solver App

The Linear Solver app solves 2×2 and 3×3 systems of linear equations. To open the Linear Solver app, press Apps and select **Linear Solver**.The Linear Solver app has two pages: one for 2×2 systems and the other for 3×3 systems. By default, the 3×3 page is displayed on opening.



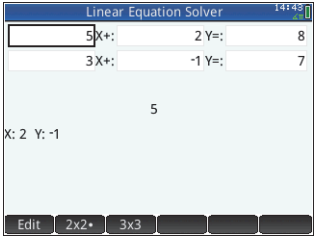
Enter a value for the coefficient of each linear equation and note the solution given below the equations. The solution shown constantly changes as you add or change the coefficients of the equations.

The menu items are:

- Edit: moves the cursor to the entry line where you can add or change a value. You can also highlight a field, enter a value, and press Enter. The cursor automatically moves to the next field, where you can enter the next value and press Enter.
- 2x2: displays the page for solving a system of 2 linear equations in 2 variables; changes to 2x2• when active
- 3x3: displays the page for solving a system of 3 linear equations in 3 variables; changes to 3x3• when active

Example

Find the solution of the linear system $5x + 2y = 8$ and $3x - y = 7$.



Solution

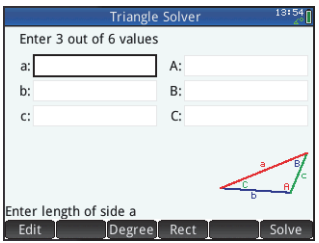
Tap 2x2 to display the 2x2 page and enter the coefficients and constants of both equations, as shown in the figure at the right. (Note: to enter a negative number, first press +/−.)

As you enter values, the solution automatically updates. The solution you want appears only when all coefficients and constants have been entered. In this example, the solution is $x = 2$ and $y = -1$.

Download from Www.Somanuals.com. All Manuals Search And Download.

Triangle Solver App

This app calculates the lengths of sides and the sizes of angles in triangles. To open the Triangle Solver app, press Apps and select **Triangle Solver**.



The lengths of sides are represented by *a*, *b*, and *c*, and the angle opposite each side is represented by *A*, *B*, and *C* respectively. Enter any 3 values—one of which must be a length—and the app will calculate the other values. The menu items are:

- Edit: moves the cursor to the entry line where you can add or change a value. (You can also just enter a value and press Enter.)
- Degree or Radians: toggles the angle measure between degrees and radians. Note that when Degree is showing, the angle measure is degrees, and when Radians is showing, the angle measure is radians.
- Rect: toggles between input forms for general- and right-angle triangles (the latter requiring one less input)
- Solve: calculates the remaining values

Example

A triangle has sides of lengths 9 and 6. The angle opposite the side measuring 6 is 30°. Find the length of the third side.

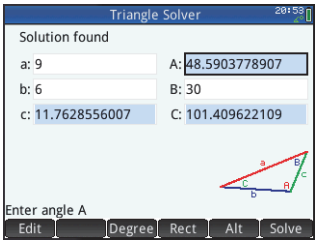
Solution

1. If necessary, tap Radians to set the angle measure to degrees.
2. Enter $a = 9$, $b = 6$, and $B = 30$.
3. Tap Solve to see the result.

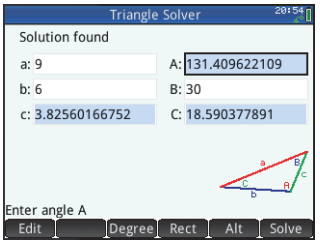
   The length of the third side is shown as $c = 11.76\ldots$ Angles *A* and *C* are also calculated.

Download from Www.Somanuals.com. All Manuals Search And Download.

Note that in this case, there is a second solution. You can tell that by the presence of a new menu item: Alt. Tap Alt to see the second solution: $c = 3.825\ldots$ Press Alt again to see the earlier result.



Solution 1



Solution 2

5 Explorer Apps

Explorer apps are designed for you to explore linear, quadratic, and trigonometric functions. Various functions and their associated graphs are shown. You can change the parameters of a function and immediately see how the graph of that function changes. You can also change a graph and immediately see the change in the parameters of the corresponding equation. You can then test your skill at matching functions with graphs.

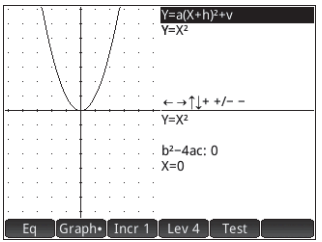
Linear Explorer and Quadratic Explorer Apps

The Linear Explorer app gives you an opportunity to explore the behavior of graphs of the form $y=ax$ and $y = ax + b$ as the values of a and b change. The Quadratic Explorer app is very similar. With it you can explore the behavior of $y = a(x + h)^2 + v$ as the values of a, h, and v change. In both apps you can change the equation and note the change in the graph, or change the graph and note the change in the equation. You can change a graph using change keys (described on page 49). You can also translate a graph by tapping on it and then dragging it.

To open the Linear Explorer app (or Quadratic Explorer app), press Apps and select **Linear Explorer** (or **Quadratic Explorer**). Since these apps are very similar, both will be treated together in this section (with the Quadratic Explorer app used as the model).

Download from Www.Somanuals.com. All Manuals Search And Download.

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) and, below it, the current equation of that form. Symbols of the keys you can use to manipulate the equation or graph appear below the equation. (These are called *change keys* below.) In the example at the right, the symbols represent the keys ▶, ◀, ▲, ▼, [+ Ans], [+/− |x|], and [− Base ;] (reading from left to right). The active change keys vary according to the graph being explored and the mode of exploration: graph or equation. Displayed beneath the symbols of the change keys is the equation, the discriminant (that is, $b^2 - 4ac$), and the roots of the quadratic.



You can press Shift Esc Clear and tap OK to reset the app at any time.

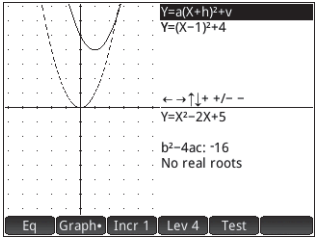
The menu items are:

- Eq: when active—indicated by a dot beside it—you can use the change keys to move between the parameters in the equation and change their values
- Graph: when active—indicated by a dot beside it—you can use the change keys to directly modify the graph
- Incr 1: chooses the increment by which parameter values will change: 0.5, 1, or 2
- Lev 4: chooses various forms of equation: there are two in the Linear Explorer and four in the Quadratic Explorer
- Test: displays the test view of the app (see below)

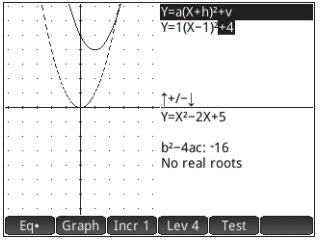
Tap Graph to activate graph mode. In this mode you use the change keys to directly change the position or shape of the graph and observe the effect on the parameters of the equation.

Tap Eq to activate equation mode. In this mode, you use the change keys to directly select and change the parameters of the equation and observe the effect on the graph.

Tap Test to enter test view. In test view you can test your skill at matching an equation to the graph shown.



Graph mode



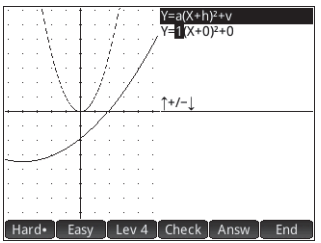
Equation mode

Download from Www.Somanuals.com. All Manuals Search And Download.

Test view is like equation mode in that you use the change keys to select and change the value of each parameter in the equation. The goal is to try to match the graph that is shown.

The menu items in test view are:

- Hard: within each level of equation (see Lev 4 below) there are a number of difficult graphs. Tap this button to cycle through them. A dot on the button (Hard•) indicates that you are testing yourself on one of the difficult graphs.
- Easy: within each level of equation there are a number of less difficult graphs. Tap this button to cycle through them. A dot on the button (Easy•) indicates that you are testing yourself on one of the less difficult graphs.
- Lev 4: chooses various forms of equation: there are two in the Linear Explorer and four in the Quadratic Explorer
- Check: lets you check your current answer against the correct answer
- Answ: displays the correct answer
- End: returns to Plot view

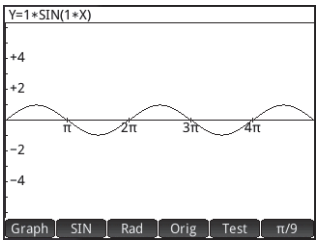


Trig Explorer App

The Trig Explorer app enables you to explore the behavior of the sinusoidal equations $y = a \cdot \sin(bx + c) + d$ and $y = a \cdot \cos(bx + c) + d$ as the values of *a*, *b*, *c*, and *d* change. You can change the equation and note the change in the graph, or change the graph and note the change in the equation. A graph can be changed using the cursor keys. It can also be translated by tapping on it and then dragging it. To open the Trig Explorer app, press Apps and select **Trig Explorer**.

Download from Www.Somanuals.com. All Manuals Search And Download.

The current equation is shown at the top of the display, with the graph of it below. The menu items are:

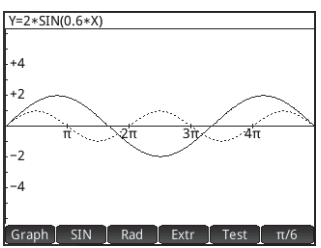


- Eq or Graph: toggles between graph and equation modes
- SIN or COS: toggles between sine and cosine graphs
- Rad or Deg: toggles between radians and degrees as the angle measure for *x*
- Orig or Extr: toggles between translating the graph (Orig), and changing its frequency or amplitude (Extr). You make these changes using the cursor keys.
- Test: displays the test view of the app (see below)
- π/9 or 20°: cycles through the increments by which certain parameters change: π/4, π/6, π/9, or 20°, 30°, 45° (depending on angle measure setting)

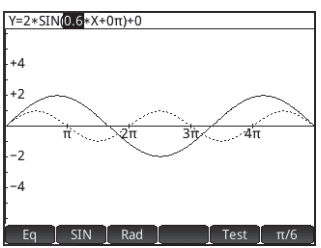
In graph mode, you use the cursor keys to modify the graph. The equation at the top of the screen changes to match what you do to the graph. The behavior of the cursor keys depends on whether Orig or Extr is chosen (see above).

The increment by which parameters *a*, *b*, and *d* change is always 0.1; the increment by which parameter *c* changes depends on your increment settings (see above).

Press +/− to reflect the graph over the *x*-axis.



Graph mode



Equation mode

In equation mode you can change the parameters of the equation directly. The graph changes to match what you do to the equation.

Press ▶ or ◀ to select a parameter.

Press ▲ or ▼ to increase or decrease the selected parameter. (The same increments apply in equation mode as in graph mode.)

Press +/− to change the sign of parameter *a*.

Download from Www.Somanuals.com. All Manuals Search And Download.

Tap Test to enter test view. In test view you can test your skill at matching an equation to the graph shown. Test view is like equation mode in that you use the cursor keys to select and change the value of each parameter in the equation. The goal is to try to match the graph that is shown. The functionality of test view in the Trig Explorer is almost identical to that of test view in the Quadratic Explorer (see page 49).

6 Creating Customized Apps

The apps that come with the HP Prime are built in and cannot be deleted. They are always available (simply by pressing Apps Info). However, you can create any number of customized instances of an app. You can also create an instance of an app that is based on a previously customized app. Customized apps are opened from the application library in the same way that you open a built-in app.

The advantage of creating a customized instance of an app is that you can continue to use the built-in app for some other problem and return to the customized app at any time with all its data still in place.

Like built-in apps, customized apps can be sent to another HP Prime calculator. This is explained in "Data sharing" on page 15.

Suppose you want to create a customized app that is based on the built-in Sequence app. The app will generate the Fibonacci sequence.

1. Press Apps Info and use the cursor keys to highlight the **Sequence** app. Don't open the app.
2. Tap Save. This enables you to create a copy of the built-in app and save it under a new name. Any data already in the built-in app is retained, and you can return to it later by opening the Sequence app.
3. In the **Name** field, enter a name for your new app—say, Fibonacci—and press Enter ≈ twice.

   Your new app is added to the application library. Note that it has the same icon as the source app—Sequence—but with the name you gave it: Fibonacci in this example. You are now ready to use this app just as you would the built-in Sequence app.

Download from Www.Somanuals.com. All Manuals Search And Download.

7 The Toolbox Menus

Comprehensive menus of functions, commands, and variables are grouped together in a set of five menus known as the Toolbox menus. You press the Toolbox key ( ) to display these menus, labeled **Math**, **CAS**, **App**, **User**, and **Catlg**.

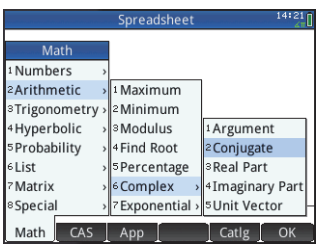
As well as the two usual techniques for selecting a menu item—tapping on it, or using the cursor keys to highlight it and then pressing Enter —you can also type part of the name of the item and the cursor will jump to it. You can also enter the number of the item as it appears on the menu. (The latter technique is illustrated on page 11.)

Math Menu

This menu contains all the math functions available to you in Home view, arranged by category. Press and, if necessary, tap Math. Select the appropriate category and then choose the function you want. For example, suppose you want to determine the complex conjugate of the complex number `6+4*i`:

1. Press (and tap Math if necessary).
2. Select **Arithmetic** from the main menu, **Complex** from the sub-menu, and **Conjugate** from the sub-sub-menu.

   The appropriate syntax—`CONJ()`—appears on the entry line ready for you to specify the complex number.
3. Enter `6+4*i` between the parentheses and press Enter. The result is `6-4*i`.



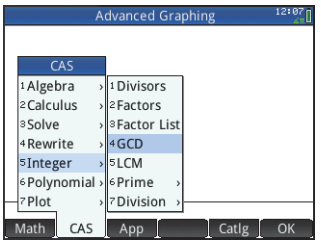
Menu format

By default, a function is presented on a math menu using its descriptive name, not its command name. Thus the command name `CONCAT` is presented as `Concatenate` and `MOD` is presented as `Modulus`. If you prefer the math menus to show the command names instead, deselect the **Menu Display** option on page 2 of the **Home Settings** screen (see page 4 above). Note that this also affects the format of the CAS menus.

Download from Www.Somanuals.com. All Manuals Search And Download.

CAS Menu

This menu contains the more common math functions available to you in the CAS, arranged by category. (Other CAS functions are available from the **Catlg** menu.) Press Mem and, if necessary, tap CAS. Select the appropriate category and then choose the function you want. For example, suppose you want to find the greatest common divisor of 4656, 764 and 8794:

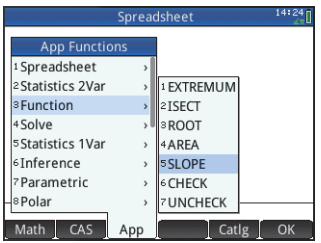


1. Press Mem (and tap CAS if necessary).
2. Select **Integer** from the main menu and **GCD** from the sub-menu.

   The function—`gcd()`—appears on the entry line ready for you to specify the numbers whose greatest common divisor you are trying to find.
3. Enter `4656, 764, 8794` between the parentheses and press Enter. The result is `2`.

App Menu

This menu lists all the app functions available to you, arranged by app. Press Mem and, if necessary, tap App. Select the appropriate app and then choose the app function you want. For example, suppose you want to find the slope of $2x^2 - 9x$ when $x = 2$. Rather than using the Function app, a quicker way is to:

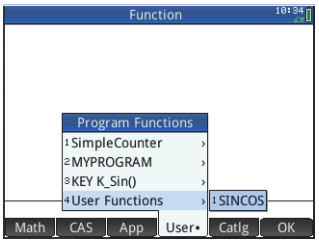


1. Press Mem (and tap App if necessary).
2. Select **Function** from the main menu and **SLOPE** from the sub-menu.

   The function `SLOPE()` appears on the entry line ready for you to specify the function and the *x*-value (separated by a comma). Note that if the current app is not the Function app, what appears on the entry line is `Function.SLOPE()`.
3. Enter `2*X^2-9*X,2` and press Enter. The result is –1.

Download from Www.Somanuals.com. All Manuals Search And Download.

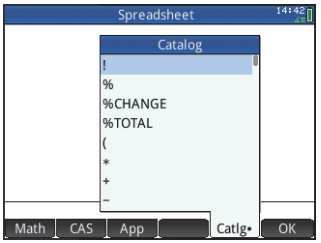
User Menu



The **User** menu lists user-defined functions and programs. For example, using the Define feature (Shift $x t \theta n$) you can define your own functions. The name you give to a function will appear on the **User** menu. You could, for instance, create the function SIN(X)+COS(Y) and name it `SINCOS`. `SINCOS` will then appear on the **User** menu. If you choose it, `SINCOS()` will appear at the position of the cursor. You then enter the arguments you specified when creating the function. Thus `SINCOS(0.5,0.75)` will yield `1.2111…` (if your angle measure setting is radians).

Programs you create using the calculator's programming language are also listed on the **User** menu if you have made them global (by using the EXPORT command). Just as you can evaluate a user-defined function by first selecting it from the **User** menu, you can also run a program by selecting it from the **User** menu.

Catalog Menu (Catlg)



The Toolbox key also gives you access to a menu of *every* command and function available on the HP Prime. Tap Catlg and tap the command or function you want. It is copied to the location of the cursor.

There are over 400 commands and functions on this menu. You may find it easier to select an item by entering the first few letters of its name. The menu automatically scrolls to the first command whose name matches the letters you entered. For example, suppose you want to find the number of positive integers not greater than and coprime to 200. Euler's totient function is a quick way of finding that number, and the function is available on the **Catlg** menu.

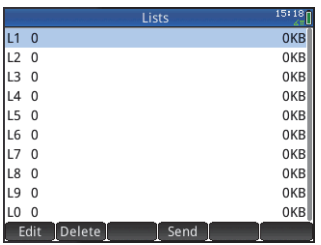
1. Press Mem (and tap Catlg if necessary).
2. Enter `eu`. Notice that the menu immediately scrolls to `euler`.
3. Select `euler`, enter 200 between the parentheses, and press Enter. The result is `80`.

Download from Www.Somanuals.com. All Manuals Search And Download.

8 Catalogs and Editors

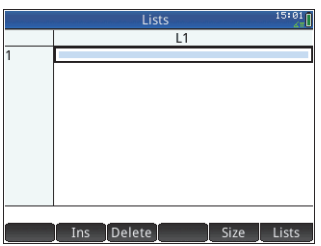
The HP Prime provides a number of handy catalogs for you to store the lists, matrices, programs, and notes you create. Each of these catalogs has an editor to help you quickly create and modify a list, matrix, program, or note. Like apps, items you add to a catalog can be sent to another HP Prime using the supplied USB cable (see “Data sharing” on page 15).

List Catalog and Editor



You can create lists of real numbers, complex numbers, expressions, matrices, and other lists. You can also perform certain mathematical operations on lists. Press Shift 7 (List) to display the List Catalog. Up to ten lists can be stored in the catalog, each named `L1`–`L9` or `L0`. The menu items in the List Catalog are:

- Edit: opens the selected list for you to add or change elements. You can also just tap on its name.
- Delete: deletes the contents of a selected list
- Send: sends a highlighted list to another HP Prime



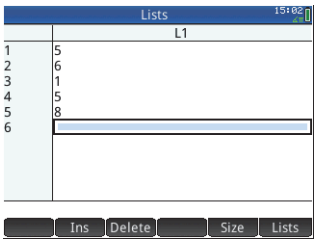
When you select a list, the List Editor opens. This is where you add elements to, or change elements in, a list. When you first open a list, it will be blank. To enter an element, just start keying it. The menu items in the List Editor are:

- Edit: copies the selected element to the entry line where it can be edited. This item is only visible when an element in the list is selected.
- Ins: inserts a new row in the list (and assigns it the value 0). The row is inserted *above* the currently selected row.
- Delete: deletes the selected row. All elements below the deleted row move up a row.
- Size: displays a menu for you to choose the small font, medium font, or large font.

Download from Www.Somanuals.com. All Manuals Search And Download.

- Lists: displays a menu for you to choose how many lists to display at one time: one, two, three, or four. For example, if you have only L4 displayed and you choose 3 from the **Lists** menu, lists L5 and L6 will be displayed in addition to L4.

Enter the first element in your list and press Enter or tap OK. The cursor jumps to the next row. Repeat until you have added all the elements you want to add. When you have completed the list, press Shift 7 (List) to return to the List Catalog.



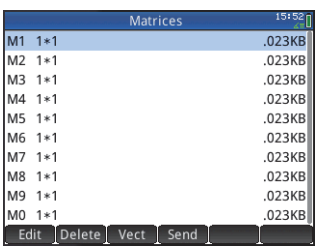
In programs and in Home view, you can refer to a list by its name (L1, L2, etc.). For example, suppose L2 is composed of {5,6,1,5,8}. In Home view, you could enter 5*L2. The result displayed is {25,30,5,25,40}. Note that each item in the new list is five times its corresponding item in L2. Note too that a list is represented by a pair of braces—{}—with each item separated by a comma. If you wanted to store your result in, say, list L6, just tap Sto ▸, enter L6, and press Enter. If you then opened the List Catalog, you would find that L6 had been populated.

You can create a list in Home view by pressing Shift 8 and entering each element separated by a comma.

Numerous list-related functions are available on the **Math** menu (see page 53).

Matrix Catalog and Editor

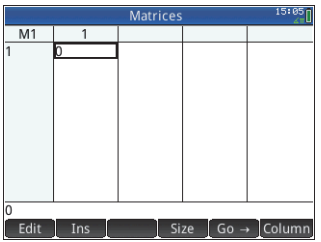
You can create both matrices and vectors. Press Shift 4 (Matrix) to display the Matrix Catalog. Up to ten matrices or vectors can be stored in the catalog, each named M1–M9 or M0. The menu items in the Matrix Catalog are:



- Edit: opens the selected matrix or vector for you to add or change elements. You can also just tap on its name.
- Delete: deletes the contents of the selected matrix or vector
- Vect: changes the selected matrix into a vector
- Send: sends the selected matrix or vector to another HP Prime

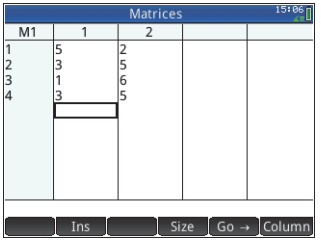
Download from Www.Somanuals.com. All Manuals Search And Download.

When you select a matrix, the Matrix Editor opens. The menu items in the Matrix Editor are:



- Edit: copies the selected element to the entry line where it can be edited. This item is only visible when an element in the matrix or vector is selected.
- Ins: displays a menu for you to choose to insert a row above the current row or a column to the left of the current column
- Size: displays a menu for you to choose the small font, medium font, or large font
- Go → or Go ↓: sets the direction the cursor moves after an element has been entered
- Column: displays a menu for you to choose how many columns to display at one time: one, two, three, or four

You don't have to define the dimensions of a matrix beforehand. Just start entering elements. You can enter values row by row, or column by column.



In programs and in Home view, you can refer to a matrix or vector by its name (`M1`, `M2`, etc.). For example, suppose `M6` is composed of [[8,0,5],[5,1,6]] and `M7` is composed of [[1,2,3],[4,5,6]]. In Home view, you could enter `M6+M7`. The result displayed is `[[9,2,8],[9,6,12]]`.

You can create a matrix or vector in Home view by pressing Shift 5 and entering each element. Use the cursor keys to move from slot to slot in the matrix template that appears.

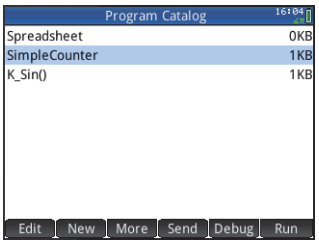
Numerous matrix-related functions are available on the **Math** menu (see page 53).

Program Catalog and Editor

The HP Prime has a powerful programming language that can be put to many uses. Programs are created and modified in an editor and stored in a catalog. Press Shift 1 (Program) to display the Program Catalog. You can edit, run, and debug a program, and send it to another HP Prime. You can also rename or remove programs.

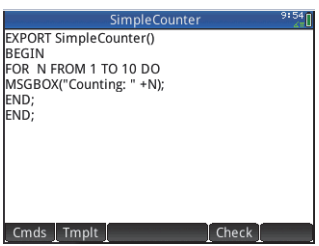
Download from Www.Somanuals.com. All Manuals Search And Download.

When there are existing programs, the menu items in the Program Catalog are:



- Edit: opens the Program Editor with the selected program shown for you to edit
- New: opens an input box for you to name a new program
- More: opens a sub-menu with the following options:
  - **Save**: create a copy of a program with a new name
  - **Rename**: rename an existing program
  - **Sort**: sort the programs (either chronologically or alphabetically)
  - **Delete**: delete the selected program
  - **Clear**: delete all programs in the Program Catalog
- Send: sends the selected program to another HP Prime
- Debug: debugs the selected program
- Run: runs the selected program

You can enter your program letter-by-letter if you know the command names, or use one of the menus available when the Program Editor is open:



- Cmds: opens the commands menu
- Tmplt: opens a menu of common branch and loop structures

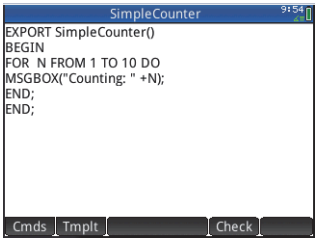
Note that the programming commands are also available from the **Catlg** menu (see page 55).

The Check button enables you to check your syntax at any time.

Once you have finished your program, return to the Program Catalog by pressing Shift 1 (Program). You will see it listed in the catalog. Tap Run to run your program. (In Home view you can enter your program's name and press Enter to run it.)

Download from Www.Somanuals.com. All Manuals Search And Download.

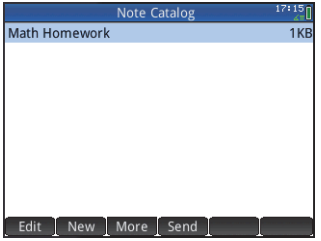
A simple program is illustrated at the right. When it runs, the value of *N* is set to 1 and the program continues until it becomes 10. The value is displayed on screen in a message box. The value is preceded by the string `Counting:`. If you tap OK or press Enter, the value of *N* is incremented by 1. The incremented value is displayed on the screen in another message box. You continue tapping OK or pressing Enter until *N* is greater than 10, at which time the program stops running.



See the *User Guide* for more information about programming the HP Prime.

Note Catalog and Editor

The HP Prime has a note-recording feature that enables you to build a library of notes. Press Shift 0 (Notes) to display the Note Catalog.

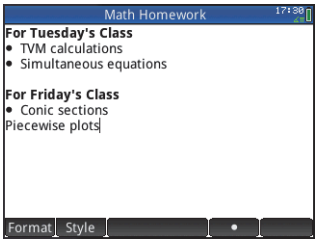


The following menu items appear (some only if at least one note has already been created):

- Edit: opens the Note Editor for you to edit the selected note
- New: opens an input form for you to give a name to a new note
- More: opens a sub-menu with the following options:
  - **Save**: create a copy of a note with a new name
  - **Rename**: rename the selected note
  - **Sort**: sort the notes (either chronologically or alphabetically)
  - **Delete**: delete the selected note
  - **Clear**: delete all notes in the Note Catalog
- Send: sends the highlighted note to another HP Prime

Download from Www.Somanuals.com. All Manuals Search And Download.

Tap New and enter a name for your new note. Tap OK twice. The Note Editor opens for you to enter your note.



The menu items in the Note Editor are:

- Format: provides options for setting the font size, foreground color, background color, and paragraph alignment
- Style: provides bold, italic, underline, full caps, superscript and subscript options
- •: cycles through three styles of bullets (placing the chosen bullet against whatever paragraph has the cursor in it). There is also an option to remove a bullet.

Download from Www.Somanuals.com. All Manuals Search And Download.

Free Manuals Download Website

http://myh66.com

http://usermanuals.us

http://www.somanuals.com

http://www.4manuals.cc

http://www.manual-lib.com

http://www.404manual.com

http://www.luxmanual.com

http://aubethermostatmanual.com

Golf course search by state

http://golfingnear.com

Email search by domain

http://emailbydomain.com

Auto manuals search

http://auto.somanuals.com

TV manuals search

http://tv.somanuals.com