

TI-83 Plus CellSheet™ Application

Getting Started

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What is the CellSheet Application?

The CellSheet™ application combines spreadsheet functionality with the power of the TI-83 Plus. The CellSheet application can be useful in classes other than math, such as social studies, business, and science.

Cells can contain:

- Integers
- Real numbers
- Formulas
- Variables
- Text and numeric strings
- Functions

Each spreadsheet contains 999 rows and 26 columns. The amount of data you can enter is limited only by the available RAM on your TI-83 Plus.

What You Need

To install and run the application, you need:

- A TI-83 Plus calculator with version 1.13 or higher of the operating system software to optimize the performance of your calculator and the application.
 - To check the operating system version, press **[2nd] [MEM]**, and then select **About**. The version number is displayed below the product name.
 - You can download a free copy of the latest operating system software from education.ti.com/softwareupdates. Follow the link to Operating Systems.
- A computer with Windows® 95/98/2000, Windows NT®, or Apple® Mac® OS 7.0 or later installed.
- A TI-GRAPH LINK™ computer-to-calculator cable. If you do not have this cable, call your distributor, or order the cable from TI's [online store](http://education.ti.com/softwareupdates).
- TI Connect™ or TI-GRAPH LINK software that is compatible with the TI-83 Plus. You can download a free copy of TI Connect or TI-GRAPH LINK software from education.ti.com/softwareupdates. Follow the link to Connectivity Software.

Where to Find Installation Instructions

Detailed instructions on installing this and other applications are available at education.ti.com/guides. Follow the link to Flash installation instructions.

Getting Help

This application has a built-in help screen that gives you basic information about using the application. The help screen is automatically displayed when you start the application.

- To display the help screen from the main spreadsheet screen, select **Menu** (press **GRAPH**), and then select **Help**.
- To exit the help screen and return to the main spreadsheet screen, press any key.

The instructions in this guidebook are only for this application. If you need help using the TI-83 Plus, refer to its comprehensive guidebook at education.ti.com/guides.

Quick Reference Guide

Starting the Application

1. Press **[APPS]**, and then select **CellSheet**. The information screen is displayed.
2. Press any key to continue. The CellSheet™ help screen is displayed.

Note By default, the help screen is displayed when you start the CellSheet application. However, you can [turn off](#) this feature.

3. Press any key to continue.

Quitting the Application

- From the main spreadsheet screen, press **[2nd] [QUIT]**.
- From the CELLSHEET MENU, select **Quit CellSheet**.

Deleting the Application from Your Calculator

- 1. Press **[2nd]** **[MEM]** to display the MEMORY menu.
- 2. Select **Mem Mgmt/Del**.
- 3. Select **Apps**.
- 4. Move the cursor to **CellSheet**.
- 5. Press **[DEL]**. A confirmation message is displayed.
- 6. Select **Yes** to delete the application.

Completing Tasks

Task	Instructions
Enter a value in a cell	Enter the value, and then press [ENTER] .
Enter text or a numeric string in a cell	<div>1. Press [ALPHA] ["].</div> <div>2. Enter the text.</div> <div>3. Press [ENTER].</div>

Task	Instructions
Create a formula	<ol style="list-style-type: none"> 1. Press [STO▶] or [+]. 2. Enter a formula. 3. Press [ENTER].
Use a variable in a spreadsheet	<ol style="list-style-type: none"> 1. From the TI-83 Plus home screen, store a value to a variable (for example, 5 [STO▶] [X]). 2. Start the CellSheet™ application, and open the spreadsheet file. 3. Move the cursor to a cell and type the variable (such as X). Do not surround the variable with quotation marks. 4. Press [ENTER]. The variable's value appears in the cell. <p>Tip: You can also use variables in formulas (e.g., =X *A5) or in cell calculations (e.g., log(X)).</p> <p>If you change the value of a variable, you must manually recalculate the spreadsheet.</p>
Navigate rapidly in a spreadsheet	<ul style="list-style-type: none"> • Press [ALPHA] [▼] to page down by 6 rows. • Press [ALPHA] [▲] to page up by 6 rows. • To jump to a specific cell, select Menu, select Edit > Go To Cell, and then enter the cell address. <p>Note: Press [ALPHA] before typing alpha characters.</p>

Task	Instructions
Switch between the spreadsheet and a chart or graph	<ol style="list-style-type: none"> 1. Select Menu, select Charts, and then select the chart you want to display. 2. To return to the spreadsheet, press [2nd] [QUIT].
Select a range of cells	<ol style="list-style-type: none"> 1. Move the cursor to the starting cell, and then press [Y=]. 2. Use [←], [↑], [→], and [↓] as needed to select the range. <p>Tip: For a large range, it might be faster to select Menu, select Edit > Select Range, and then specify the range (for example, A6:A105).</p>
Insert a row	<ol style="list-style-type: none"> 1. Press [←] as needed to select the row. 2. Press [2nd] [INS] to insert a row above the selected row.
Insert a column	<ol style="list-style-type: none"> 1. Press [↑] or [ALPHA] [↑] as needed to select the column. 2. Press [2nd] [INS] to insert a column to the left of the selected column.

Task	Instructions
Delete a row or column	<ol style="list-style-type: none"> <li data-bbox="448 101 1037 158">1. Move the cursor to the row header or column header to select the row or column. <li data-bbox="448 181 635 215">2. Press DEL. <p data-bbox="448 238 996 296">The columns to the right of the deleted column shift left.</p> <p data-bbox="448 301 900 336">The rows below a deleted row shift up.</p>
Clear data from a cell, cell range, row, or column	<ol style="list-style-type: none"> <li data-bbox="448 359 1037 393">1. Select one or more cells, a row, or a column. <li data-bbox="448 410 670 445">2. Press CLEAR.

Task	Instructions
Cut, copy, and paste	<p data-bbox="453 109 717 137">To cut or copy a cell:</p> <ol data-bbox="453 149 843 321" style="list-style-type: none"> <li data-bbox="453 149 843 177">1. Move the cursor to the cell. <li data-bbox="453 195 843 321">2. Press [WINDOW] to cut the cell. —or— Press [ZOOM] to copy the cell. <p data-bbox="453 355 843 384">To cut or copy a range of cells:</p> <ol data-bbox="453 396 1073 660" style="list-style-type: none"> <li data-bbox="453 396 1073 424">1. Move the cursor to the first cell in the range. <li data-bbox="453 441 625 470">2. Press [Y=]. <li data-bbox="453 487 1073 516">3. Move the cursor to the last cell in the range. <li data-bbox="453 533 1073 660">4. Select Cut (press [WINDOW]) to cut the cell range. —or— Select Copy (press [ZOOM]) to copy the cell range. <p data-bbox="453 683 568 711">To paste:</p> <ol data-bbox="453 728 1090 895" style="list-style-type: none"> <li data-bbox="453 728 860 757">1. Cut or copy one or more cells. <li data-bbox="453 774 1090 838">2. Move the cursor to the new cell (or the first cell of a new cell range). <li data-bbox="453 855 832 895">3. Select Paste (press [TRACE]).

Task	Instructions
Grab cell reference	<ol style="list-style-type: none"> 1. While entering or editing a formula, place the cursor on the edit line where you want to enter a cell reference. 2. Press [APPS]. 3. Use the arrow keys to move the cursor to the cell that contains the formula or value that you want to copy. 4. Press [ENTER]. The address of the cell you referenced appears on the edit line (where you placed the cursor in step 1) and is now part of the current formula.
Grab range reference	<ol style="list-style-type: none"> 1. While entering or editing a formula, place the cursor on the edit line where you want to enter a range reference. 2. Press [APPS]. 3. Use the arrow keys to move the cursor to the first cell in the range that you want to copy. 4. Press [Y=], and then move the cursor to the last cell in the range that you want to copy. 5. Press [ENTER]. The cell range that you referenced appears on the edit line (where you placed the cursor in step 1) and is now part of the current formula.

CellSheet Main Menu

- To display the CELLSHEET MENU, select **Menu** (press **GRAPH**).
- To display a help screen for common tasks, select **Help** from the CELLSHEET MENU.
- To exit the application, select **Quit CellSheet** from the CELLSHEET MENU.
- Press **CLEAR** or **2nd** **[QUIT]** to
 - Return to the main menu from a submenu
 - Return to the spreadsheet from the main menu

File Menu

Menu Item	Description
1: Open	Opens an existing spreadsheet file.
2: Save As	Saves the current spreadsheet with a different name.
3: New	Creates a new spreadsheet and lets you enter a unique name.
4: Delete	Deletes a spreadsheet. You cannot delete the currently open spreadsheet.

Menu Item	Description
5: Format	Lets you set up formatting options such as automatic recalculation, cursor movement, help screen display, and edit line display.
6: Recalc	Recalculates the spreadsheet (only needed when the autocalculation feature in the Format menu is turned off)

Edit Menu

Menu Item	Description
1: Go To Cell	Moves the cursor to a specific cell.
2: Undelete Cell	Retrieves the contents of the cell that you just deleted or cleared.
3: Clear Sheet	Deletes all data from the current spreadsheet.
4: Select Range	Selects a range of cells.
5: Cut	Cuts the contents and formulas from the currently selected cell or range of cells and places them on the clipboard. (Shortcut key: WINDOW)
6: Copy	Copies the contents and formulas from the currently selected cell or range of cells and places them on the clipboard. (Shortcut key: ZOOM)
7: Paste	Pastes the contents and formulas that were just cut or copied to the clipboard into the current cell. (Shortcut key: TRACE)

Options Menu

Menu Item	Description
1: Statistics	Calculates 1-variable statistics, 2-variable statistics, or linear regression for the currently selected cell range.
2: Fill Range	Fills a range of cells with a formula, number, or text.
3: Sequence	Fills a range of cells with a sequence of numbers.
4: Import/Export	Imports lists or matrices, or variables; exports lists, matrices, or variables.
5: Sort	Sorts a range of cells in ascending or descending order.
6: Col Decimal	Sets the decimal mode display for a column. The calculator decimal mode display (accessed by pressing MODE) does not affect the CellSheet™ application.

Charts Menu

Menu Item	Description
1: Scatter	Displays a scatter chart for a range of cells.
2: Scatter Window	Displays the parameters for the viewing window for the scatter chart so that you can change the values.
3: Line	Displays a line chart for a range of cells.
4: Line Window	Displays the parameters for the viewing window for the line chart so that you can change the values.
5: Bar	Displays a bar chart for a range of cells.
6: Bar Window	Displays the parameters for the viewing window for the bar chart so that you can change the values.
7: Pie	Displays a pie chart for a range of cells.

Starting and Quitting the Application

Starting the Application

1. Press **APPS** to display the list of applications on your calculator.
2. Select **CellSheet**. The information screen is displayed.
3. Press any key to continue. The help screen is displayed.

Note

By default, the help screen is displayed when you start the CellSheet™ application. However, you can [turn off](#) this feature.

4. Press any key to continue. A blank spreadsheet (or the last spreadsheet that you opened) displays, and cell A1 is selected.

The first four characters of the spreadsheet's name appear in the upper left corner of the spreadsheet. You can press **◀ ▶** to highlight the name cell and view the full name on the edit line.

Quitting the Application

- Press **[2nd] [QUIT]** from the main spreadsheet screen.
—or—
- Select **Menu** (press **[GRAPH]**) from the main spreadsheet screen, and then select **Quit CellSheet**.

Getting Started

Work through the following example to get acquainted with the main features of the CellSheet™ application.

Example—Margaret used her QuickCash credit card to purchase a \$1500 item. QuickCash charges 1.5 percent interest that is compounded monthly. The required minimum monthly payment is 3 percent of the balance. Assuming that Margaret makes the minimum monthly payment, how much interest and principal will she have paid in six months?

- ▶ Start the CellSheet application.
1. Press **[APPS]** to display the list of applications on your calculator.

2. Select **CellSheet**. The information screen is displayed.
3. Press any key to continue. The help screen is displayed.
4. Press any key to continue. A blank spreadsheet (or the last spreadsheet that you opened) is displayed.

Note

If the last spreadsheet that you opened is displayed, create a new spreadsheet file. To do this, select **Menu** (press **GRAPH**), select **File > New**, enter a name for the spreadsheet, and then press **ENTER** two times.

► Enter these column headings:

P = principal

I = interest accrued

PMT = minimum monthly payment

Tip

- To indicate that an entry is a text string, press **ALPHA** **["]**.
- To turn on alpha-lock mode, press **2nd** **[A-LOCK]**.
- To complete an entry, press **ENTER**.

1. With the cursor in cell A1, enter the principal column heading, **P** (**2nd** **[A-LOCK]** **["]** **P** **ENTER**).
2. Move the cursor to cell B1, and enter the interest accrued column heading, **I** (**2nd** **[A-LOCK]** **["]** **I** **ENTER**).

3. Move the cursor to cell C1, and enter the minimum monthly payment column heading, **PMT** (**[2nd]** **[A-LOCK]** **["]** **PMT** **[ENTER]**).

Your spreadsheet should look like this:

501	A	B	C
1	P	I	PMT
2			
3			
4			
5			
6			
C2:		[Menu]	

- Enter the initial data for the spreadsheet in cells A2, B2, and C2.

$$P = 1500$$

$$I = P \times .015$$

$$PMT = P \times .03$$

Note To indicate that an entry is a formula, press **[STO▶]** to place an equal sign on the edit line.

1. Move the cursor to cell A2, and enter **1500**. (**1500** **[ENTER]**)
2. Move the cursor to cell B2, and then enter the formula **=A2 × .015**. (**[STO▶]** **[ALPHA]** **A2** **[×]** **[.]** **015** **[ENTER]**)

3. Move the cursor to cell C2, and then enter the formula



$$= A2 \times .03$$
(STO►) (ALPHA) A2 (×) (.) 03 (ENTER)).

Your spreadsheet should look like this:


501	A	B	C
1	P	I	PMT
2	1500	22.5	45
3			
4			
5			
6			
C3: (Menu)			

- At the beginning of each month, the new principal, P_2 , is calculated using the following formula: $P_2 = P_1 - (PMT_1 - I_1)$, where P_1 , PMT_1 , and I_1 all pertain to the previous month. The interest and minimum monthly payment are calculated exactly as they were for the first month. Enter the remaining spreadsheet formulas to find the solution to the problem.
1. Move the cursor to cell A3, and then enter the formula

$$= A2 - (C2 - B2)$$
(STO►) (ALPHA) A2 (-) ((ALPHA C2 - ALPHA B2) (ENTER)).
 2. To copy the formulas from B2:C2 to B3:C3, place the cursor in cell B2, and press (Y=) to begin the range selection.

- Press  to move the cursor to C2, and then select **Copy** (press ) to copy the formula from this range of cells.

S01	A	B	C
1	P	I	PMT
2	1500	22.5	45
3	1477.5		
4			
5			
6			
[Paste Menu]			

- Move the cursor to cell B3, and then select **Paste** (press ) to paste the formula from this range of cells.

S01	A	B	C
1	P	I	PMT
2	1500	22.5	45
3	1477.5		
4			
5			
6			
[Paste Menu]			

- Press   to exit the copy/paste mode.

S01	A	B	C
1	P	I	PMT
2	1500	22.5	45
3	1477.5	22.163	44.325
4			
5			
6			
B3: =A3*B.015 [Menu]			

- Enter the data for the remaining four months by copying the formulas from A3:C3 to rows 4 through 7.

Tip

- To copy and paste a range of cells, press **[Y=]**, select the range, select **Copy** (press **[ZOOM]**), move the cursor to the new location, and then select **Paste** (press **[TRACE]**).
- To copy a single cell, press **[ZOOM]**, move the cursor to the new location, and then select **Paste**.

1. With the cursor in cell A3, copy the formulas from A3:C3 (**[Y=]** **[▶]** **[▶]** **Copy**).
2. Move the cursor to cell A4, and then select **Paste** (press **[TRACE]**) to paste the formulas into A4:C4.
3. Move the cursor to cell A5, and then select **Paste** to paste the formulas into A5:C5.
4. Paste the formulas to A6:C6 and A7:C7.
5. Press **[2nd]** **[QUIT]** to exit copy/paste mode.
6. Move the cursor to cell A7, copy the formula, and paste it in cell A8 (**[ZOOM]** **[▼]** **Paste** **[2nd]** **[QUIT]**). This amount, \$1370, is the remaining principal to be paid after six payments have been made.

Your spreadsheet should look like this:

S01	A	B	C
1	P	I	PMT
2	1500	22.5	45
3	1477.5	22.163	44.325
4	1455.3	21.83	43.66
5	1433.5	21.503	43.005
6	1412	21.18	42.36
A1:	P [Menu]		

S01	A	B	C
3	1477.5	22.163	44.325
4	1455.3	21.83	43.66
5	1433.5	21.503	43.005
6	1412	21.18	42.36
7	1390.8	20.862	41.725
8	1370		
AB:	=A7-(C7-B7) [Menu]		

- Using the following formulas, calculate how much interest and principal Margaret will have paid after six months.

The total principal paid is $1500 - P_7$.

The total interest paid is the sum of I_1 through I_6 .

The total of the payments made is the sum of PMT_1 through PMT_6 .

1. Move the cursor to cell A9, and then enter the formula **=1500 - A8** (**[STO▶]** **1500** **[=]** **[ALPHA]** **A8** **[ENTER]**).
2. Move the cursor to cell B9, and then press **[STO▶]**.
3. Press **[GRAPH]** to display a list of functions, and then select **sum(**.
4. Press **[APPS]**, and then move the cursor to cell B2.
5. Press **[Y=]** to begin range selection.

6. Move the cursor to cell B7, and then press **[ENTER]**.
7. Press **[)]** to complete the formula, and then press **[ENTER]**.

Tip

You could also directly enter the formula by pressing **[STO▶]**
[GRAPH] **1** **[ALPHA]** **B2** **[ALPHA]** **[:]** **[ALPHA]** **B7** **[)]** **[ENTER]**.

8. Move the cursor to cell B9, copy the formula, and then paste it in cell C9 (**[ZOOM]** **[▶]** **Paste** **[2nd]** **[QUIT]**).

Your spreadsheet should look like this:

S01	A	B	C
5	1433.5	21.503	43.005
6	1412	21.18	42.36
7	1390.8	20.862	41.725
8	1370		
9	130.04	130.04	260.08
10			
C9: =sum(C2:C7)			[Menu]

You can see that after 6 months, Margaret will have paid \$260.08, which included \$130.04 in interest and \$130.04 in principal.

- Save the spreadsheet with the name **INTEREST**.

Each spreadsheet is automatically saved in RAM as you work on it. Default names, beginning with S01, are used to name the spreadsheets before you save your file with a unique name.

1. Select **Menu** (press **[GRAPH]**) to display the CellSheet™ menus.

2. Select **File > Save As**. The old name is displayed, and the cursor is at the **New** prompt. Alpha-lock is turned on.
3. At the **New** prompt, type **INTEREST** as the name for this spreadsheet, and then press **[ENTER]**.

Note

- The spreadsheet name must begin with a letter, but can contain both letters and numbers.
- The spreadsheet name can have up to 8 characters.

4. Press **[ENTER]** again to accept the name and return to the spreadsheet screen. The first few letters of the new spreadsheet name are displayed in the upper left corner of the screen.

DATE	A	B	C
5	1433.5	21.503	43.005
6	1412	21.18	42.36
7	1390.8	20.862	41.725
8	1370		
9	130.04	130.04	260.08
10			
[C9: =sum(C2:C8)]			[Menu]

- Quit the application.

From the main spreadsheet screen, press **[2nd] [QUIT]**.

Creating, Saving, and Opening Files

Creating a File

To create a new, blank spreadsheet:

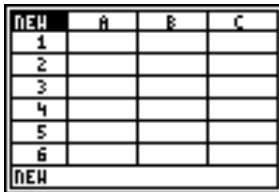
1. Select **Menu** (press **[GRAPH]**) to display the CELLSHEET MENU.
2. Select **File > New**.
3. Enter a name for the new spreadsheet, and then press **[ENTER]** two times. A new, blank spreadsheet is displayed.

Tip

The spreadsheet name

- can contain numbers and letters, but must begin with a letter
- can contain up to 8 characters

TICSFILE is a reserved name used by the CellSheet™ application.



NEW	A	B	C
1			
2			
3			
4			
5			
6			

Saving a File

The spreadsheet is automatically saved in RAM as you work. You do not have to manually save your work. However, you can save the current spreadsheet with a new file name.

To save a file with a new name:

1. Select **Menu** (press **GRAPH**).
2. Select **File > Save As**.
3. Enter a name for the new spreadsheet, and then press **ENTER** two times. The spreadsheet is displayed, and the first four characters of the new name are displayed in the top left cell.

Tip

The spreadsheet name

- can contain numbers and letters, but must begin with a letter
- can contain up to 8 characters

TICSFILE is a reserved name used by the CellSheet™ application.

Opening a File

1. Select **Menu** (press **GRAPH**).
2. Select **File**, and then select **Open**. A list of spreadsheet file names is displayed.
3. Move the cursor to the spreadsheet name that you want to open, and then press **ENTER**.

Tip

- Only one spreadsheet can be open at a time.
- Names of archived spreadsheets do not appear in the list. You must unarchive a spreadsheet before you can open it.

Managing Files

Copying a File

To copy a spreadsheet file, [save the file with a new name](#).

Deleting a File

1. Select **Menu** (press **GRAPH**).
2. Select **File > Delete**.

3. Move the cursor to the spreadsheet file name that you want to delete, and then press **ENTER**.

Note You cannot delete the spreadsheet that is currently open.

4. Select **Yes**. The spreadsheet file is deleted.

Tip

- If you need to free RAM on your TI-83 Plus, you can save a copy of a spreadsheet on your computer using TIconnect™ or TI-GGRAPH LINK™ software before you delete it.
- You can also delete a spreadsheet using the memory management menu from the home screen (**2nd** **[MEM]**, **Mem Mgmt/Del** > **AppVars** {spreadsheet name} **[DEL]** **Yes**).

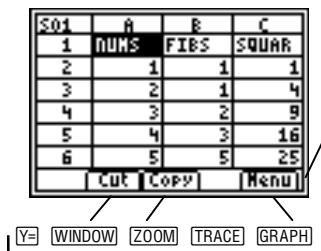
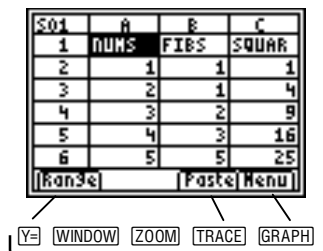
Renaming a File

To rename a file, [save the file with a new name](#), and then [delete the old spreadsheet](#).

Using CellSheet Commands

The CellSheet™ application displays commands at the bottom of the screen at various times to help you complete specific tasks. To select a command, press the graphing key directly below the command.

Option	Description
Range (press Y=)	Turns on range selection mode
Cut (press WINDOW)	Allows the contents of the cell or range of cells to be moved to a new location using the Paste tool
Copy (press ZOOM)	Allows the contents of the cell or range of cells to be copied to a new location using the Paste tool
Paste (press TRACE)	Pastes the contents of the cell or range of cells selected with Cut or Copy to the cursor location
Menu (press GRAPH)	Displays the CellSheet™ main menu



Press a graphing key to select a command.

Working with Spreadsheets

Navigating in the Spreadsheet

- Use the arrow keys to move from one cell to another.
- Press **[ALPHA]** **[↓]** to move the cursor down 6 rows.
- Press **[ALPHA]** **[↑]** to move the cursor up 6 rows.
- To jump to a specific cell, select **Menu**, select **Edit > Go To Cell**, enter the cell address, and then press **[ENTER]** two times.

Tip

Press **[ALPHA]** before entering the column letter of the cell address at the Cell prompt.

Changing the Default Values for Individual Spreadsheets

Select **Menu**, select **File > Format**, and then change any of the following default settings. The changes only apply to the current spreadsheet.

Menu Item	Description	Default Setting
AutoCalc	Automatically recalculates the entire spreadsheet as you work; does not automatically recalculate the spreadsheet upon opening the file. Note: When AutoCalc is set to N, cells with new formulas that you create will display the value 0 until you manually recalculate the spreadsheet.	Y (yes)
Cursor Mvmt	Controls the direction that the cursor moves after you press ENTER on the edit line.	↓ (down)
Init Help	Controls whether the help screen is displayed when you start the application.	Y (yes)
Show	Controls what information is displayed on the edit line – formulas or resultant values.	FMLA (formula)

Entering Spreadsheet Data

- A numeric value, text string, or formula that is entered into a single cell can contain a maximum of 40 characters.
- Numeric values are right-justified in the cell; text is left-justified.
- The number of characters that are displayed is limited by the [column decimal format](#) for numeric values, and by the contents of the adjacent cell(s) for text. The edit line displays the entire contents of the cell.
- The displayed value of the cell is rounded to the number of decimal places specified by the [column decimal format](#). However, the actual value of the cell is used in calculations.
- Cells that contain text are treated as if they contained the value 0 when they are referenced in math operations, statistics, or charts.
- Cells that contain text are ignored when they are referenced in cell ranges that are used in formulas.

Caution

As you enter data into a large spreadsheet, each entry may require a few seconds of processing time, particularly if the AutoCalc feature is on. The CellSheet™ application does not recognize keystrokes that are made during the processing time.

Entering Numbers and Text

- To enter a numeric value in a cell, type the number, and then press **[ENTER]**. Values can be entered in normal, scientific, or engineering notation. The way the values are displayed is determined by the calculator's notation mode. You can change the notation mode from the calculator's home screen by pressing **[MODE]**, and then selecting **Normal**, **Sci** or **Eng**.

Note ■ The CellSheet™ application does not support complex numbers. ■

- To enter text in a cell, press **[ALPHA]** **["]** (or **[2nd]** **[A-LOCK]** **["]**), and then enter the text. Any character string that is preceded by quotation marks is treated as text. Dates and times must be entered as text.
- To enter the last entry from the home screen, press **[2nd]** **[ENTRY]**. You can cycle through the last few entries on the home screen by pressing **[2nd]** **[ENTRY]** multiple times.

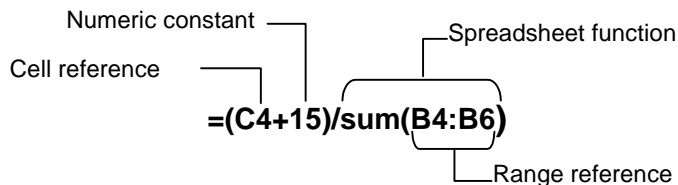
Entering a Formula

A formula is an equation that performs operations on spreadsheet data. Formulas can:

- Perform mathematical operations, such as addition and multiplication
- Compare worksheet values
- Refer to other cells in the same spreadsheet

When you use a formula, the formula and the evaluation of the formula are both saved in the cell.

The following example adds 15 to the value in cell C4 and then divides the result by the sum of the values in cells B4, B5, and B6.



To enter a formula, press **[STO▶]** to place an equal sign on the edit line, and then enter the formula.

Note

- If you do not precede a formula that contains a cell reference with an equal sign, the application interprets the column reference as a variable, which usually results in an error.
- If a formula references a cell that is empty, ERROR or 0 is displayed, depending on how the empty cell was used in the formula.

If [AutoCalc is turned on](#), the spreadsheet is automatically recalculated as you enter data into or edit data in the spreadsheet.

Tip

- The spreadsheet is not automatically recalculated upon opening the spreadsheet file. You must [manually recalculate](#) the spreadsheet if it contains references to lists, matrices, or variables that have changed.
- You may want to [turn off the autocalc feature](#) if your spreadsheet is large. Large spreadsheets can take a minute or more to recalculate.

Entering an Absolute Cell Reference

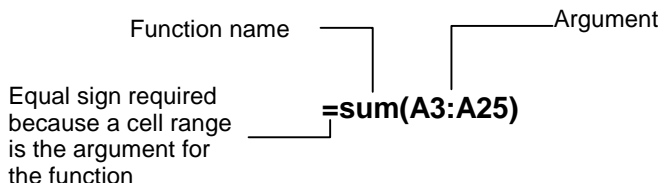
If you do not want a cell reference to be updated when you copy or move a formula to a different cell, use an absolute reference. (Relative references are updated when the cell is copied or cut and moved to a new location.) You can enter the following types of absolute references:

Reference	Description
\$A\$1	Absolute column and absolute row
\$A1	Absolute column and relative row
A\$1	Relative column and absolute row

To enter an absolute cell reference, press **[2nd] [RCL]** to place a dollar sign on the edit line.

Entering a Function

A function is a predefined formula that performs calculations by using specific values in a particular order. The values are called arguments. The arguments can be numbers, lists, cell names, cell ranges, etc., depending on what the function requires. The arguments are enclosed in parentheses, and a comma separates each argument.



Note ■ The ending parenthesis is required! ■

- When a function uses a cell name or range as arguments, it must be preceded by an equal sign; otherwise, no equal sign is necessary.
- When the function is not preceded by an equal sign, only the resulting value of the function is saved in the cell; the entire function and its arguments are not saved.

- If a function's argument is a list, a cell range is also a valid argument.
- If a function's argument is a value, a cell name is also a valid argument.

You can use any function in the TI-83 Plus catalog ($\boxed{2\text{nd}} \text{ [CATALOG]}$) or in any menu, such as Math ($\boxed{\text{MATH}}$), List ($\boxed{2\text{nd}} \text{ [LIST]}$), or Test ($\boxed{2\text{nd}} \text{ [TEST]}$).

To enter a function:

1. Press $\boxed{\text{STO}} \blacktriangleright$ to place the equal sign on the edit line, if necessary.
2. Press $\boxed{\text{GRAPH}}$ to display a list of commonly used functions, move the cursor to a function, and then press $\boxed{\text{ENTER}}$ to select it.

—or—

Select a function from the calculator catalog or other menus, such as Math, List, or Test.

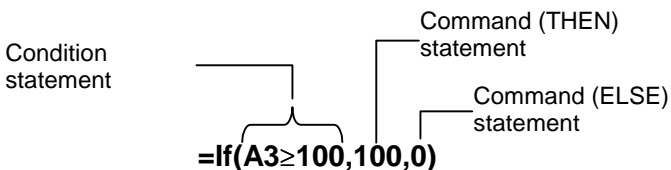
3. Enter the argument(s) for the function, and then press $\boxed{\text{ENTER}}$.

Using the IF Function

In an IF function, the IF statement evaluates to true or false. The THEN command is executed if the IF statement is true; the ELSE command is executed if the IF statement is false.

When you need to use an IF function in a spreadsheet, press **[STO▶] [GRAPH]**, and then select **If** from the FUNCTIONS menu. The IF function in the CellSheet™ application is not the same as the IF function in the TI-83 Plus catalog. (The IF function in the catalog is for programming.)

- The condition statement (the IF statement) can contain cell references, values, or variables.
- The command statements (the THEN and ELSE statements) can contain a values or expressions.
- The operator symbols are available from the TEST menu (**[2nd] [TEST]**)



Note

The CellSheet application does not support nested functions (a function within a function).

Using Stored Variables

To use a stored variable in a cell or formula, enter the variable name without using quotation marks. For example, enter **5*A** to multiply the value stored in A by 5.

Note You can use the [Export Var option](#) to store a value to a variable.

Copying Cells

When you copy a cell, the CellSheet™ application copies the entire cell, including formulas and their resulting values. Relative cell references are automatically updated when you paste the cell(s) to a new location.

The following instructions show how to use the CellSheet application's shortcut keys to copy and paste cells. You can also use the commands from the EDIT menu to copy and paste cells (select **Menu**, and then select **Edit**).

Copying a Single Cell

1. Move the cursor to the cell that you want to copy.
2. Press **[ZOOM]** to copy the cell to the clipboard.

3. Move the cursor to the new cell where you want to paste the clipboard contents, and then select **Paste** (press **TRACE**).

Tip

You can paste the clipboard contents to a new cell multiple times.

4. Press **2nd** **[QUIT]** to exit the copy/paste mode.

Copying a Single Cell to a Range of Cells

1. Move the cursor to the cell that you want to copy.
2. Press **ZOOM** to copy the cell to the clipboard.
3. Move the cursor to the first cell of the range where you want to paste the clipboard contents.
4. Select **Range** (press **Y=**), move the cursor to the last cell in the range, and then select **Paste** (press **TRACE**).

Tip

You can select an entire row or column by moving the cursor to the row header or column header. The entire row or column is highlighted when it is selected.

Copying a Range of Cells

You can copy a range of cells using one of the following methods.

Method 1:

1. Move the cursor to the first cell in the range.
2. Press **[Y=]**, and then move the cursor to the last cell in the range.

Tip

You can select an entire row or column by moving the cursor to the row header or column header. The entire row or column is highlighted when it is selected.

3. Select **Copy** (press **[ZOOM]**) to copy the range to the clipboard.
4. Move the cursor to the first cell where you want to paste the clipboard contents, and then select **Paste** (press **[TRACE]**).

Tip

You can paste the clipboard contents to a new cell range multiple times.

Method 2:

1. Select **Menu**, and then select **Edit > Select Range**.
2. Enter the range of cells (for example A1:A9) at the Range prompt.
3. Press **[ENTER]** two times to select the range and return to the spreadsheet. The last cell in the range is highlighted.
4. Select **Copy**, move the cursor to the first cell where you want to copy the range you selected, and then select **Paste**.
5. Press **[2nd] [QUIT]** to exit the copy/paste mode.

Editing Spreadsheet Data

Editing Cell Contents

You can change a cell's contents by entering a new text string, value, or formula in place of the existing one.

If you want to edit the existing contents, move the cursor to the cell that you want to edit, and then press **[ENTER]**. The cursor moves to the edit line at the bottom of the screen. You can use the arrow keys to move the cursor to the part of the entry that needs to be changed.

Tip

If you have not yet pressed **[ENTER]** to change a cell's content, you can press **[2nd] [QUIT]** to revert to the previous contents of a cell.

Inserting and Deleting Rows and Columns

If possible, cell references are adjusted when you insert or delete rows or columns. Absolute cell references are not adjusted.

Inserting a Row

1. Move the cursor to the row header where you want to insert a blank row.
2. Press **[2nd] [INS]**. A blank row is inserted at the cursor location.

Inserting a Column

1. Move the cursor to the column header where you want to insert a blank column.
2. Press **[2nd] [INS]**. A blank column is inserted to the left of the cursor location.

Cutting and Moving Cells

When you move a cell, the CellSheet™ application moves the entire cell, including formulas and their resulting values. Cell references are automatically updated when you paste a cell or cell range to the new location.

Cutting and Moving a Single Cell

1. Move the cursor to the cell that you want to cut.
2. Press **[WINDOW]** to copy the cell to the clipboard.
3. Move the cursor to the cell where you want to move the clipboard contents, and then select **Paste** (press **[TRACE]**).

Cutting and Moving a Range of Cells

1. Move the cursor to the first cell in the range.
2. Press **[Y=]**, and then move the cursor to the last cell in the range.
3. Select **Cut** (press **[WINDOW]**) to copy the range to the clipboard.
4. Move the cursor to the first cell where you want to move the clipboard contents, and then select **Paste** (press **[TRACE]**).

Deleting Cell Contents, Rows, and Columns

Deleting a Cell's Contents

1. Move the cursor to the cell whose contents you want to delete.
2. Press **[DEL]** or **[CLEAR]** to delete the contents of the cell.

Tip You can select **Menu**, and then select **Edit > Undelete Cell** to undo this deletion.

Deleting a Row

1. Move the cursor to the row header for the row that you want to delete.
2. Press **[DEL]** to delete the row. Rows below the deleted row are shifted up.

Caution You cannot undelete this deletion.

Deleting a Column

1. Move the cursor to the column header for the column that you want to delete.
2. Press **DEL** to delete the column. Columns to the right of the deleted column are shifted left.

Caution You cannot undelete this deletion.

Undo Deletion

If you delete a cell's contents, you can undelete it immediately after you deleted it. You cannot undelete deleted rows, columns, or ranges of cells.

To undelete a cell, select **Menu**, and then select **Edit > Undelete Cell**.

Clearing the Spreadsheet

1. Select **Menu**, and then select **Edit > Clear Sheet**.
2. Select **Yes** to confirm that you want to clear the spreadsheet.

Caution You cannot undo this action.

Recalculating a Spreadsheet

- When you start the CellSheet™ application, the auto-calculation feature is turned on. If you have turned it off, you must recalculate the spreadsheet manually.
- The spreadsheet is not automatically recalculated when you open it. If the spreadsheet contains formulas that reference variables, lists, or matrices that have changed, you must recalculate the spreadsheet manually.

To recalculate the spreadsheet, select **Menu**, and then select **File > Recalc**.

Deleting a Spreadsheet

1. Select **Menu**, and then select **File > Delete**.
2. Move the cursor to the spreadsheet that you want to delete, and then press **ENTER**.

Tip ■ You cannot delete the spreadsheet that is currently open. ■

3. Select **Yes** to confirm the deletion.

Using the Tools on the Options Menu

Analyzing Data

Note

- When you perform statistics or a linear regression on a range of cells, empty cells in the range are treated as if they contained the value 0.
- You can select a range on which to perform statistics before you select the statistics type. The range is automatically entered at the appropriate prompts.

Performing 1-Var Statistics

1. Select **Menu**, and then select **Options > Statistics > 1-Var Stats**.
2. Enter the range for the calculation at the Range prompt.
3. Press ENTER two times to perform the calculation.

Performing 2-Var Statistics

1. Select **Menu**, and then select **Options > Statistics > 2-Var Stats**.
2. Enter the first range for the calculation at the 1st Range prompt, and then press **ENTER**.
3. Enter the second range for the calculation at the 2nd Range prompt.
4. Press **ENTER** two times to perform the calculation.

Performing a Linear Regression

1. Select **Menu**, and then select **Options > Statistics > LinReg (ax+b)**.
2. Enter the range for the x-variable at the XRange prompt.

Tip Press **ENTER** to move the cursor to each subsequent prompt.

3. Enter the range for the y-variable at the YRange prompt.
4. If necessary, enter the range for the frequency of the variables at the FrqRange prompt.

5. Enter a y-variable to store the equation at the Sto Eqn To prompt. To do this, press **[VARS]** **[▶]**, select **Function**, select a y-variable from the list displayed.
6. Press **[ENTER]** two times to perform the calculation.

Example—Examine the relationship between the age (in years) and the average height (in centimeters) of a young person.

Age is given by the list {1, 3, 5, 7, 9, 11, 13}.

Average height is given by the list {75, 92, 108, 121, 130, 142, 155}.

- Set up the column headings and enter the data.
1. [Create a new spreadsheet file](#) named **HEIGHT**.
 2. [Enter the column headings](#) **AGE** and **HEIGHT** in cells A1 and B1.
 3. Use the [sequence option](#) to enter the list of ages in cells A2 through A8.

4. [Enter the heights](#) in cells B2 through B8.

Your spreadsheet should look like this:

HTG	A	B	C
4	5	108	
5	7	121	
6	9	130	
7	11	142	
8	13	155	
9			
B9: Menu			

► Graph the data and store the graph to a pic variable.

1. Select **Menu**, and then select **Charts > Line**.
2. Enter **A2:A8** at the XRange prompt.

Tip ■ Press **ENTER** to move the cursor to each subsequent prompt. ■

3. Enter **B2:B8** at the YRange prompt.

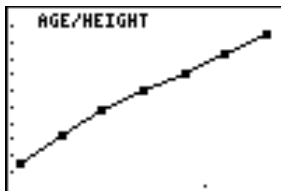
4. Enter **AGE/HEIGHT** at the Title prompt.

Tip

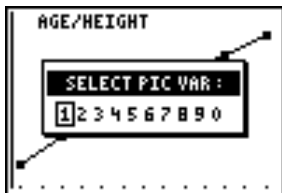
- Alpha-lock mode is on when the cursor is at the Title prompt.
- Press **[ALPHA]** to turn off alpha-lock mode to type the slash mark (press **[÷]**).
- Press **[2nd] [A-LOCK]** to turn alpha-lock back on.

```
LINE CHART
XRange:A2:A8
YRange1:B2:B8
YRange2:
YRange3:
Title:AGE/HEIGHT
AxesOn AxesOff
DrawFit Draw
```

5. Press **[ENTER]** 3 times to accept the default values **AxesOn** and **DrawFit** and draw the line.



6. Press **[STO▶]** to display the SELECT PIC VAR dialog box.



7. Use the arrow keys to highlight a variable name, and then press **[ENTER]** to select it.

What type of relationship do you observe?

8. Press **[2nd] [QUIT]** to return to the spreadsheet.

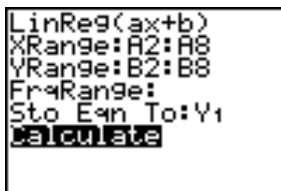
- Perform a linear regression to get the best line of fit for the data.

1. Select **Menu** and then select **Options > Statistics > LinReg(ax+b)**.
2. Enter **A2:A8** at the XRange prompt.
3. Enter **B2:B8** at the YRange1 prompt.

4. At the Sto Eqn To prompt, press **[VARS]**, and then press **[▶]** to select Y-VARS.
5. Select **Function**, and then press **[ENTER]** to select **Y1**. The y-variable name Y1 is copied to the prompt.


Tip

You cannot simply enter Y1 at the Sto Eqn To prompt. You must select Y1 from the Y-VARS Function menu.



LinReg(ax+b)
XRange:A2:A8
YRange:B2:B8
FrqRange:
Sto Eqn To:Y1
Calculate

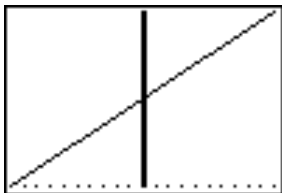
6. Press **[ENTER]** 2 times to calculate the linear regression.



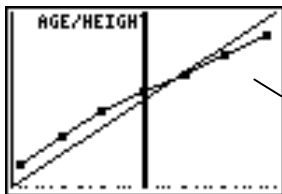
HFTG | a | b | r
Lin Reg(ax+b)
y = ax+b
a = 6.464285714
b = 72.32142857
E9: | Menu

- View the graph of the linear regression and the data by displaying the graph of the linear regression and the pic file of the line chart.

1. Press **[2nd]** **[QUIT]** two times to exit the application.
2. Press **[GRAPH]** to display the graph of the linear regression.



3. Press **[2nd]** **[DRAW]** **[▶]** **[▶]**, and then select **RecallPic**.
4. Press **[VARS]**, select **Picture**, select **Pic1**, and then press **[ENTER]**. The graph is displayed, showing the CellSheet™ chart and the linear regression.



You can see that the data fits the regression line well.

Filling a Range

You can fill a range with text, a number, or with a formula. The range is filled beginning with the top left cell in the range. If you fill a range with a formula, relative cell references or range references are adjusted as the range is filled.

1. Select **Menu**, and then select **Options > Fill Range**.
2. Enter the spreadsheet range that you want to fill (for example A1:A10), and then press **ENTER**.
3. Enter the text, number, or formula at the Formula prompt.

Note If you enter a formula, it must begin with an = or +.

4. Press **ENTER** two times to fill the range.

FILL	B	C	D
1	8	3	15
2	9	6	20
3	10	9	25
4	11	12	30
5	12	15	35
6	13	18	40
D4: =sum(A4:C4) [Menu]			

This spreadsheet contains 25 rows of data. Each row needed to be totaled, so the range D1:D25 was filled with the formula =sum(A1:C1). Notice that the row numbers in the formulas automatically incremented, just as they would have if the formula had been copied to the range.

Entering a Sequence

1. Select **Menu**, and then select **Options > Sequence**.
2. Enter the beginning cell address at the 1st Cell prompt (for example, **D5**), and then press **ENTER**.
3. Enter the arguments for the sequence function at the seq(prompt, and then press **ENTER**. (Example: **seq(x,x,3,10,2)** for the sequence **3, 5, 7, 9**.)
4. Select either **Down** or **Right** (to enter the number sequence down the spreadsheet or across the spreadsheet), by moving the cursor to the option and pressing **ENTER**.
5. Press **ENTER** to return to the spreadsheet and enter the sequence.

Importing and Exporting Data

Note When you export data from a range of cells, empty cells in the range are treated as if they contained the value 0.

Importing Data from a List

1. Select **Menu**, and then select **Options > Import/Export > Import List**.
2. Enter the list name at the List Name prompt, and then press **ENTER**.

Tip You can enter the list name, or select it from the LIST NAMES menu (**2nd** **LIST**).

3. Enter the cell address for the first cell where you want the list imported at the 1st Cell prompt, and then press **ENTER**.
4. Select **Down** to import the list into a column, and then press **ENTER**.

—or—

Select **Right** to import the list into a row.

5. Press **ENTER** two times to import the list.

Exporting Data to a List

Note Exporting data from a row takes much longer than exporting data from a column.

1. Select **Menu**, and then select **Options > Import/Export > Export List**.
2. Enter the range to export at the **Range** prompt, and then press **ENTER**.
3. Enter the list name at the **List Name** prompt.

Tip You can enter the list name, or select it from the **LIST NAMES** menu (**2nd** **[LIST]**).

4. Press **ENTER** two times to export the list.

Importing Data from a Matrix

1. Select **Menu**, and then select **Options > Import/Export > Import Matrix**.
2. Enter the matrix name at the Matrix Name prompt, and then press **ENTER**.

Note Select the matrix name from the MATRIX NAMES menu (**2nd** [MATRIX]).

3. Enter the cell address for the first cell where you want the matrix imported at the 1st Cell prompt.
4. Press **ENTER** two times to import the matrix.

Exporting Data to a Matrix

1. Select **Menu**, and then select **Options > Import/Export > Export Matrix**.
2. Enter the range to export at the Range prompt, and then press **ENTER**.

3. Enter the matrix name at the Matrix Name prompt.

Note Select the matrix name from the MATRIX NAMES menu (**2nd** [MATRIX]).

4. Press **ENTER** two times to export the matrix.

Exporting Data to a Variable

1. Select **Menu**, and then select **Options > Import/Export > Export Var**.
2. Enter the cell to export at the From Cell prompt, and then press **ENTER**.
3. Enter the variable name at the Var Name prompt.

Tip Press **ALPHA** before entering each letter of the name, or press **2nd** [A-LOCK] to turn on alpha-lock mode.

4. Press **ENTER** two times to export the data to a variable.

Sorting Data

You can sort columns of data whose cells contain numbers. If any cell in the column contains a formula or text, the column cannot be sorted.

1. Select **Menu**, and then select **Options > Sort**.
2. Enter the range to sort at the Range prompt.
3. Select **Ascend** or **Descend** by moving the cursor to the option and pressing **ENTER**.
4. Press **ENTER** again to sort the range.

Changing the Column Format

You can change the number of decimal places that are displayed in each column. The cells display as many digits of the fixed decimal mode as possible in the given width of the cell.

Decimal mode	Description
Float	Floating decimal mode that displays up to 5 digits, plus the sign and decimal
012345	Fixed decimal mode that specifies the number of digits (0 through 5) to display to the right of the decimal.

1. Select **Menu**, and then select **Options > Col Decimal**.
2. Enter the column label (**A**, **B**, **C**, etc.), and then press **[ENTER]**. The current decimal mode setting is highlighted.
3. Move the cursor to a decimal mode, and then press **[ENTER]** two times to change the mode and return to the spreadsheet.

Working with Charts

Creating a Scatter Chart

1. Select **Menu**, and then select **Charts > Scatter**.
2. Enter the range for the X-coordinates at the XRange prompt.

Tip

- You can select a range that you want to chart before you select the chart type. The range is automatically entered at the appropriate prompts.
- Press **ENTER** to move the cursor to the each subsequent prompt.

3. Enter the range for the Y-coordinates at the YRange1 prompt.
4. If necessary, enter YRange2, and YRange3.
5. Enter a title for the chart at the Title prompt.

Tip

- Alpha-lock mode is on when you move the cursor to this prompt.
- Entering a title for the chart is optional.

6. Select either **AxesOn**, or **AxesOff** (to turn the X and Y axes on or off) by moving the cursor to the selection and pressing **ENTER**.

Note If AxesOff is selected on the TI-83 Plus format menu (**2nd** [FORMAT]), selecting AxesOn for this chart has no effect.

7. Select either **DrawFit** or **Draw** by moving the cursor to the selection and pressing **ENTER**. The chart is displayed.

Note The DrawFit option changes the window settings so that the chart is displayed on the screen. If you select Draw, the chart might be displayed outside of the viewing window.

8. To see the X and Y coordinates for each point, press **TRACE**, and then use the arrow keys to move from point to point.
9. Press **2nd** [QUIT] two times to exit trace mode and return to the spreadsheet.

Note If necessary, you can change the window settings for the chart.

1. From the CHARTS menu, select **Scatter Window**.
2. Change the values as necessary, and then either select **Draw** to display the chart or select **Save** to save the window settings and return to the spreadsheet.

Example—A person starts walking for exercise and charts her progress. Enter the following data into a spreadsheet, calculate minutes per mile for each day, and then create a chart that shows her progress.

Day	Distance Walked	Time
1	1	30
2	1.05	30
3	1.1	30
4	1.15	30
5	1.2	30
6	2.0	45
7	2.0	45
8	1.3	30
9	1.35	30
10	1.4	30

- Enter the spreadsheet headings and data.
- 1. [Create a new spreadsheet file](#) named **WALKING**.
- 2. [Enter the following headings](#) in cells A1:D1: **DAY**, **DIST**, **TIME**, **MIN/MILE**.

3. [Enter the sequence](#) 1:10 in cells A2:A11. The arguments for the function are **X,X,1,10** (you are entering the sequence X where X is the variable from 1 to 10).
4. Your spreadsheet should look like this:

WALK	A	B	C
1	DAY	DIST	TIME
2		1	
3		2	
4		3	
5		4	
6		5	
B6: [Menu]			

WALK	A	B	C
6	5		
7	6		
8	7		
9	8		
10	9		
11	10		
B11: [Menu]			

5. Enter the data for the **DIST** and **TIME** columns from the [table](#) above.
 - Calculate the number of minutes per mile that the person walked on each day in column D.
1. Move the cursor to cell D2, and [enter the formula](#) **=C2/B2**.
2. [Copy the formula](#) in cell D2 to cells D3:D11.

Your spreadsheet should look like this:

WALK	A	B	C
1	DAY	DIST	TIME
2	1	1	30
3	2	1.05	30
4	3	1.1	30
5	4	1.15	30
6	5	1.2	30
A1:	DAY		[Menu]

WALK	C	D	E
1	TIME	MIN/MILE	
2	30	30	
3	30	28.571	
4	30	27.273	
5	30	26.087	
6	30	25	
E1:			[Menu]

- Create a scatter chart for the data using the DAY column for XRange, and the MIN/MI column for the YRange.

1. Select **Menu**, and then select **Charts > Scatter**.
2. Enter **A2:A11** at the XRange prompt.

Tip ■ Press **[ENTER]** to move the cursor to each subsequent prompt. ■

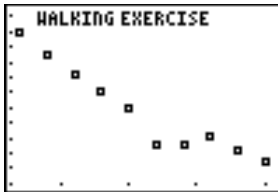
3. Enter **D2:D11** at the YRange1 prompt.

4. Enter **WALK** at the Title prompt.

Tip Alpha-lock mode is on when the cursor is at this prompt.

```
SCATTER CHART
XRange:A2:A11
YRange1:D2:D11
YRange2:
YRange3:
Title:WALKING E...
AxesOn AxesOff
DrawFit Draw
```

5. Press **[ENTER]** two times to display the scatter chart.
6. Press **[TRACE]**, and then use the arrow keys to move from point to point and display the data values.



7. Press **[2nd] [QUIT]** two times to exit trace mode and return to the spreadsheet.

Creating a Line Chart

1. Select **Menu**, and then select **Charts > Line**.
2. Enter the range for the X-coordinates at the XRange prompt (for example A2:A11), and then press **ENTER**.

Tip

- You can select a range that you want to chart before you select the chart type. The range is automatically entered at the appropriate prompts.
- Press **ENTER** to move the cursor to each subsequent prompt.

3. Enter the range for the Y-coordinates at the YRange1 prompt (for example B2:B11).
4. If necessary, enter YRange2, and YRange3.
5. Enter a title for the chart at the **Title** prompt.

Tip

Alpha-lock mode is on when you move the cursor to this prompt.

6. Select either **AxesOn**, or **AxesOff** (to turn the X and Y axes on or off) by moving the cursor to the selection and pressing **ENTER**.

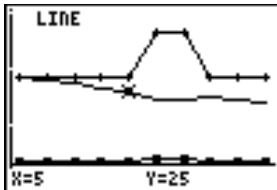
7. Select either **DrawFit** or **Draw** (to select the window settings for the drawing) by moving the cursor to the selection and pressing **[ENTER]**. The chart is displayed.

Tip

The DrawFit option changes the window settings so that the chart is displayed on the screen. If you select Draw, the chart might be displayed outside of the viewing window.

```
LINE CHART
XRange:A2:A11
YRange1:B2:B11
YRange2:C2:C11
YRange3:D2:D11
Title:LINE
AxesOn AxesOff
DrawFit Draw
```

8. Press **[TRACE]** and use the arrow keys to view the data elements.



9. Press **[2nd] [QUIT]** twice to return to the spreadsheet.

Note

If necessary, you can change the window settings for the chart.

1. From the CHARTS menu, select **Scatter Window**.
2. Change the values as necessary, and then either select **Draw** to display the chart or select **Save** to save the window settings and return to the spreadsheet.

Creating a Bar Chart

1. Select **Menu**, and then select **Charts > Bar**.
2. Enter the range for the category labels at the Categories prompt, and then press **[ENTER]**.
3. Enter the range for the first category at the Series1 prompt, and then press **[ENTER]**.

Tip

- You can select a range that you want to chart before you select the chart type. The range is automatically entered at the appropriate prompts.
- Press **[ENTER]** to move the cursor to each subsequent prompt.

4. Enter a name for the first category at the Ser1Name prompt.

Tip

Alpha-lock mode is on when you move the cursor to this prompt.

5. Enter the range for the second category at the Series2 prompt.
6. Enter a name for the second category at the Ser2Name prompt.
7. If necessary, enter the range for the third category at the Series3 prompt.
8. If necessary, enter a name for the third category at the Ser3Name prompt.
9. Enter a title for the chart at the Title prompt.

Tip Alpha-lock mode is on when you move the cursor to this prompt.

10. Select either **Vertical**, or **Horiz** (to display the chart either vertically or horizontally) by moving the cursor to the selection and pressing **ENTER**.

Tip You can return to the BAR CHART screen later and change the display without having to enter the other parameters again.

11. Select either **DrawFit** or **Draw** (to select the window settings for the drawing) by moving the cursor to the selection and pressing **[ENTER]**. The chart is displayed.

Tip

- The DrawFit option changes the window settings so that the chart is displayed on the screen. If you select Draw, the chart might be displayed outside of the viewing window.
- If the entire chart will not fit on one screen, arrows are displayed on the left side of the screen. Press the arrow keys to view the part of the chart that is not currently displayed.

12. Press **[TRACE]** and use the arrow keys to view the data elements.

13. Press **[2nd]** **[QUIT]** twice to return to the spreadsheet.

Note

- If necessary, you can change the window settings for the chart.
1. From the CHARTS menu, select **Scatter Window**.
 2. Change the values as necessary, and then either select **Draw** to display the chart or select **Save** to save the window settings and return to the spreadsheet.

Example—Create a bar chart that shows the following average temperatures (in degrees Fahrenheit) for each month in a particular area for the years 1999 and 2000.

Month	1999	2000
Jan	30	27
Feb	34	36
Mar	35	44
Apr	51	46
May	60	66
Jun	66	57
Jul	71	74
Aug	71	75
Sep	62	73
Oct	50	53
Nov	44	39
Dec	35	23

1. [Create a new spreadsheet file](#) named **TEMPS**.
2. [Enter the headings](#) **MONTH**, **1999**, and **2000** in cells A1:C1.
3. Enter the data in the MONTH, 1999, and 2000 columns from the [table](#) above.

Your spreadsheet should look like this:

TEMP	A	B	C
1	MONTH	1999	2000
2	JAN	30	27
3	FEB	34	36
4	MAR	35	44
5	APR	51	46
6	MAY	60	66
A1:	MONTH		[Menu]

- Create a bar chart for the data using A2:A13 as the categories, B2:B13 as the first series, and C2:C13 as the second series.

1. Enter **A2:A13** at the Categories prompt.

Tip ■ Press **[ENTER]** to move the cursor to each subsequent prompt. ■

2. Enter **B2:B13** at the Series1 prompt.

3. Enter **1999** at the Ser1Name prompt.

Note ■ Press **[ALPHA]** to turn the alpha-lock mode off. ■

4. Enter **C2:C13** at the Series2 prompt.

5. Enter **2000** at the Ser2Name prompt.

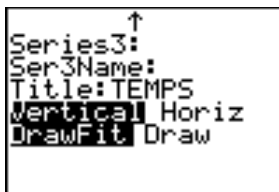
Note Press **[ALPHA]** to turn the alpha-lock mode off.



```
BAR CHART
Categories:A2:A1
Series1:B2:B13
Ser1Name:1999
Series2:C2:C13
Ser2Name:2000
↓
```

6. Enter **TEMPS** at the Title prompt.

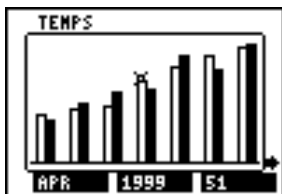
Tip Alpha-lock mode is on when you move the cursor to this prompt.



```
↑
Series3:
Ser3Name:
Title:TEMPS
Vertical Horiz
DrawFit Draw
```

7. Press **[ENTER]** two times to display the chart.

- Press **TRACE**, and then press the arrow keys to display the data and labels for each bar.



- Press **2nd** **[QUIT]** two times to return to the spreadsheet.

Creating a Pie Chart

- Select **Menu**, and then select **Charts > Pie**.
- Enter the range for the category labels at the **Categories** prompt.

Tip Press **ENTER** to move the cursor to each subsequent prompt.

- Enter the range for the chart at the **Series** prompt.

Tip You can select a range that you want to chart before you select the chart type. The range is automatically entered at the appropriate prompts.

4. Select **Number** or **Percent** by moving the cursor to the option and pressing **ENTER**.

Tip

- If you select **Number**, the data from the spreadsheet is displayed in the pie chart.
- If you select **Percent**, the percentage of the whole that each data element makes up is displayed in the pie chart.

5. Enter a title for the chart at the **Title** prompt.

Tip

Alpha-lock mode is on when you move the cursor to this prompt.

6. Select **Draw** to display the chart.

Example—The following data was gathered about the types of pets that are found in homes in four different areas of a city. Display a pie chart that shows the numbers of households in the city that have each pet and the percentages of households in each area that have pets.

Area	Cats	Dogs	Fish
1	32	20	3
2	12	15	7
3	5	7	9
4	17	14	12

- Enter the headings and data for the spreadsheet.
1. [Create a new spreadsheet file](#) named **PETS**.
 2. [Enter the headings](#) **AREA**, **CATS**, **DOGS**, and **FISH** into cells A1:D1.
 3. [Enter the data](#) from the [table](#) above below the headings in the spreadsheet.

Your spreadsheet should look like this:

PETS	A	B	C
1	AREA	CATS	DOGS
2	1	32	20
3	2	12	15
4	3	5	7
5	4	17	14
6			
A1: "AREA" (Menu)			

PETS	C	D	E
1	DOGS	FISH	
2	20	3	
3	15	7	
4	7	9	
5	14	12	
6			
E1: (Menu)			

- Calculate the number of each type of pet in the city and the number of pets in each area.
1. [Enter the sum](#) of the CATS column in cell B6.
 2. [Copy the formula](#) to cells C6 and D6.
 3. [Enter the sum](#) of pets in Area 1 of the city in cell E2.

4. [Copy the formula](#) to cells E3:E5.

Your spreadsheet should look like this:

PETS	A	B	C
1	AREA	CATS	DOGS
2		1	32
3		2	12
4		3	5
5		4	17
6			66
A6:		[Menu]	

PETS	C	D	E
1	DOGS	FISH	
2	20	3	55
3	15	7	34
4	7	9	21
5	14	12	43
6	56	31	
E6:		[Menu]	

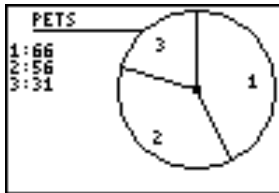
- Create a pie chart that shows the number of the types of pets in the households.

1. Select **Menu**, and then select **Charts > Pie**.
2. Enter the range for the category labels at the Categories prompt (**B1:D1**).

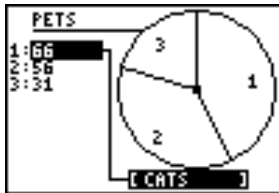
Tip ■ Press **[ENTER]** to move the cursor to each subsequent prompt. ■

3. Enter the range for the data (**B6:D6**) at the Series prompt.
4. Select **Number** by moving the cursor to the option and pressing **[ENTER]**.
5. Enter the title **PETS** at the Title prompt.

6. Press **[ENTER]** again to display the chart.



7. Press **[TRACE]** and use the arrow keys to display the category labels.

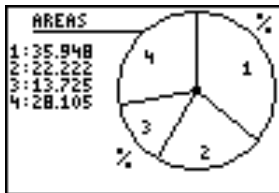


8. Press **[2nd] [QUIT]** two times to exit the pie chart.

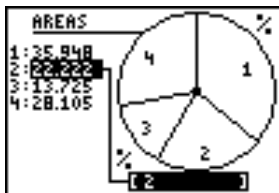
- ▶ Create a pie chart that shows the percentage of households that have pets by city area.

1. Select **Menu**, and then select **Charts > Pie**.
2. Enter the range for the category labels at the Categories prompt (**A2:A5**).

3. Enter the range for the data (**E2:E5**) at the Series prompt.
4. Select **Percent** by moving the cursor to the option and pressing **[ENTER]**.
5. Enter the title **AREAS** at the Title prompt.
6. Press **[ENTER]** again to display the chart.



7. Press **[TRACE]** and use the arrow keys to display the category labels.
8. Press **[2nd] [QUIT]** two times to exit the pie chart.



Examples

Example 1—How much would a person who weighs 125 pounds on Earth weigh on each of the nine planets?

► Enter the headings and data into the spreadsheet.

1. [Create a new spreadsheet file](#) named **GRAVITY**.
2. [Enter the following spreadsheet headings](#) in cells A1:C1.
PLANET – planet name
GRAV – gravitational factor
WT – weight
3. [Enter the following data](#) for the first two columns.

Planet	Gravitational factor
M (Mercury)	0.38
V (Venus)	0.91
E (Earth)	1
M (Mars)	0.38
J (Jupiter)	2.54
S (Saturn)	1.08
U (Uranus)	0.91
N (Neptune)	1.19
P (Pluto)	0.06

- Enter **125** in cell C4.

Your spreadsheet should look like this:

GRAV	A	B	C
1	PLANET	GRAV	WT
2	M	.04	
3	V	.09	
4	E	1.00	125
5	M	.04	
6	J	2.54	
A1: "PLANET" [Menu]			

GRAV	A	B	C
7	S	1.08	
8	U	.91	
9	N	1.19	
10	P	.06	
11			
12			
A12: [Menu]			

- Calculate the weight of the 125-pound person on the rest of the planets.
- [Enter the formula](#) $=\$C\$4 \times B2$ in cell C2.
 - [Copy the formula](#) in cell C2 to cell C3
 - [Copy the formula](#) in cell C3 to cells C5:C10.

GRAV	A	B	C
6	J	2.54	317.5
7	S	1.08	135
8	U	.91	113.75
9	N	1.19	148.75
10	P	.06	7.5
11			
C10: $=\$C\$4 * B10$ [Menu]			

4. To view the weights as whole numbers [change the column decimal format](#) to 0.

```
COL DECIMAL
Col:C
Float 012345
Enter
```

GRAV	A	B	C
6	J	2.54	318
7	S	1.08	135
8	U	.91	114
9	n	1.19	149
10	P	.06	8
11			
C10: =5C54*B10			[Menu]

Example 2—Make a chart of interest earned on \$1000 at 6% per year.

1. [Create a new spreadsheet file](#) named **INTEREST**.
2. [Enter the reference data](#), 1000 in cell A1, and .06 in cell A2.
3. [Enter the following column headings](#) in cells B1:C1.
YEAR – the number of years that the principle has earned interest.
BAL – the sum of the principal and the interest
4. [Enter the sequence](#) 1 – 10 in cells B2:B11.

Your spreadsheet should look like this:

DATE	A	B	C
1	1000	YEAR	BAL
2	.06	1	
3		2	
4		3	
5		4	
6		5	
A6: [Menu]			

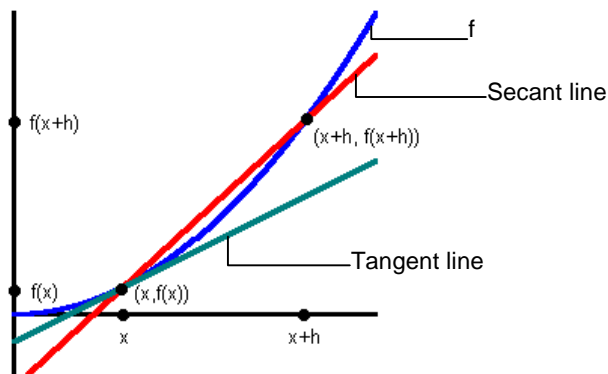
DATE	A	B	C
7		6	
8		7	
9		8	
10		9	
11		10	
12			
A12: [Menu]			

5. [Enter the formula](#) $=\$A\$1(1+\$A\$2)^B2$ in cell C2.
6. [Copy the formula](#) in cell C2 to cells C3:C11.

DATE	A	B	C
1	1000	YEAR	BAL
2	.06	1	1060
3		2	1123.6
4		3	1191
5		4	1262.5
6		5	1338.2
C1: "BAL" [Menu]			

DATE	A	B	C
7		6	1418.5
8		7	1503.6
9		8	1593.8
10		9	1689.5
11		10	1790.8
12			
C12: [Menu]			

Example 3—Examine the relationship between the slope of a secant line on a curve and a tangent line to the curve.



What is the slope of the tangent line of $f(x) = x^2$ at $x = 3$?
Compare the slope of the secant line to the tangent line as the point $(x+h, f(x+h))$ gets closer to the point $(x, f(x))$ at $x = 3$. The derivative of the function at $x = 3$ is the slope of the tangent line.

1. [Create a new spreadsheet file](#) named **DERIV**.

2. Enter the following headings in cells A1:F1:

X value of x

H(RHS) value of h from the right hand side

X+H value of x+h

SEC SLP slope of the secant line

TAN SLP slope of the tangent line which will be calculated using the
derivative $f'(3) = 2 \times 3 = 6$

TAN SEC slope of the tangent line minus the slope of the secant line

DERIV	A	B	C
1	X	H(RHS)	X+H
2			
3			
4			
5			
6			
A1: "X"		[Menu]	

You need to begin the comparison with h a large distance away from x. As h gets closer to x, you can see a trend develop. For this example, begin with $h = 100$, with each subsequent h value 1/10 of the preceding h value.

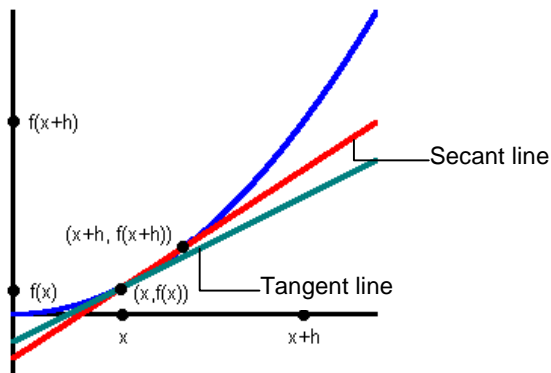
3. Enter 3 for x in cells A2 through A16 using the [fill range](#) option.

4. Enter **100** in cell B2 for the initial value of h.
5. [Enter the formula](#) **=B2/10** in cell B3.
6. [Copy the formula](#) from cell B3 to cells B4 through B16.
7. [Enter the formula](#) **=A2+B2** in cell C2.
8. [Copy the formula](#) from cell C2 to cells C3 through C16.
9. [Enter the formula](#) **=(C2^2-A2^2)/B2** in cell D2 (slope of the secant line).
10. [Copy the formula](#) from cell D2 to cells D3 through D16.
11. [Enter the formula](#) **=2*A2** in cell E2 (slope of the tangent line).
12. [Copy the formula](#) from cell E2 to cells E3 through E16.
13. [Enter the formula](#) **=E2-D2** in cell F2 (difference in the slope of the secant and tangent lines).
14. [Copy the formula](#) from cell F2 to cells F3 through F16.

You can see that as h gets smaller (and thus, $x + h$ gets closer to x), the slope of the secant line gets closer to the slope of the tangent line.

DEFT	A	B	C
5	3	.10000	3.1
6	3	.01000	3.01
7	3	.00100	3.001
8	3	1.0E-4	3.0001
9	3	1.0E-5	3
10	3	1.0E-6	3
A10: 3		[Menu]	

DEFT	D	E	F
5	6.1	6	-.1
6	6.01	6	-.01
7	6.001	6	-.001
8	6.0001	6	-1E-4
9	6	6	-1E-5
10	6	6	-1E-6
F10: =E10-D10		[Menu]	



Example 4—Which one increases faster, Fibonacci number or the sequence of squares?

Fibonacci	The first two terms are 1 and 1, and each succeeding term is the sum of the two immediately preceding terms.
Squares	Squares each term in the whole number series, beginning with 1.

- Enter the headings and the first list of data.
- 1. [Create a new spreadsheet file](#) named **FIB**.
- 2. [Enter the following headings](#) in cells A1:C1.
NUMS – whole numbers
FIBS – Fibonacci numbers
SQUARES – squares
- 3. Use the [sequence option](#) to fill cells A2:A19 with the sequence of whole numbers {1,2,3, ..., 18}.

Your spreadsheet should look like this:

FIB	A	B	C
1	NUMS	FIBS	SQUAR
2		1	
3		2	
4		3	
5		4	
6		5	
B1: "NUMS			(Menu)

- Set up the data for the FIBS column.
- 1. Enter 1 in cells B2 and B3.
- 2. [Enter the formula](#) **=B2+B3** in cell B4.
- 3. [Copy the formula](#) to cells B5:B19.

FIB	A	B	C
1	NUMS	FIBS	SQUAR
2		1	1
3		2	1
4		3	2
5		4	3
6		5	5
B1: "FIBS			(Menu)

FIB	A	B	C
7		6	8
8		7	13
9		8	21
10		9	34
11		10	55
12		11	89
B12: =B10+B11			(Menu)

FIB	A	B	C
14		13	233
15		14	377
16		15	610
17		16	987
18		17	1597
19		18	2584
B19: =B17+B18			(Menu)

► Set up the data for the SQUARES column.

1. Enter the formula $=A2^2$ in cell C2.

2. Copy the formula to cells C3:C19.

Your spreadsheet should look like this:

FIB	A	B	C
1	NUMS	FIBS	SQUAR
2	1	1	1
3	2	1	4
4	3	2	9
5	4	3	16
6	5	5	25
C1: "SQUARES"			[Menu]

FIB	A	B	C
7	6	8	36
8	7	13	49
9	8	21	64
10	9	34	81
11	10	55	100
12	11	89	121
C12: =A12^2			[Menu]

FIB	A	B	C
14	13	233	169
15	14	377	196
16	15	610	225
17	16	987	256
18	17	1597	289
19	18	2584	324
C19: =A19^2			[Menu]

You can see that the Fibonacci numbers increase much more rapidly than the squares after the 12th step.

Errors, Error Messages, and Restrictions

Each cell that contains a formula displays **ERROR** if there is an error in any cell formula to alert you that an error exists. The error is always in the last cell that you entered or edited.

If the error is in a cell that contains a formula, you do not have to correct the error immediately. You can continue editing the spreadsheet without making a correction. However, if the error is in a cell that does not contain a formula, you must correct the error before you can continue editing the spreadsheet.

Message	Description
INVALID CELL, INVALID RANGE.	This occurs when you type in an invalid cell or a range such as A0, BZ12, or A1:A1000. Valid cells are A1 to Z999.
CIRCLE REF	This occurs when the logic of cell formulas results in a loop, for example when A1 is set to =A1.
CANNOT SORT	The CellSheet™ application does not sort ranges that contain formulas.
INVALID NAME	The name that you entered is too long, or contains characters that are invalid.

Message	Description
INVALID LIST, INVALID MATRIX, INVALID VAR	The list name, matrix name, or variable name does not exist.
SYNTAX	This occurs when you enter an invalid cell reference (e.g., A0), or if you delete a cell that is referred to by another cell.

If you encounter error messages that are not listed above, check the [TI-83 Plus manual](#) for more information.

Installation Error Messages

Low Battery

Do not attempt to download a Flash application if the low-battery message appears on the TI-83 Plus home screen. Low battery indication is shown on the initial screen. If you receive this error during an installation, change the batteries before trying again.

Archive Full

This error occurs when the TI-83 Plus does not have sufficient memory for the application. In order to make room for another application, you must delete an application and/or archived variables from the TI-83 Plus. Before you delete an application from the TI-83 Plus, you can save it on your computer using TI Connect™ or TI-GGRAPH LINK™ software for the TI-83 Plus. You can reload it to the TI-83 Plus later using TI Connect or TI-GGRAPH LINK software.

Communication Error

This error indicates that the TI Connect™ software (“Unable to communicate with device”) or TI-GGRAPH LINK™ software (“Link Transmission Error”) is unable to communicate with the TI-83 Plus. The problem is usually associated with the TI-GGRAPH LINK cable and its connection to the TI-83 Plus and/or to the computer.

- Make sure the cable is firmly inserted in the calculator I/O port and the computer.
- Verify that the correct cable type is selected in the TI Connect or TI-GGRAPH LINK link settings.
- Verify that the correct communications port (Com Port) is selected in the TI Connect or TI-GGRAPH LINK link settings.

If this does not correct the problem, try a different TI-GGRAPH LINK cable and reboot your computer. If you continue to get this error, please contact [TI-Cares](#)™ Customer Support for assistance.

Error in Xmit

This problem is usually associated with the unit-to-unit cable and its connection between the TI-83 Plus calculators. Make sure the cable is firmly inserted in the I/O port of each calculator.

If you continue to get this error, please contact [TI-Cares](#)™ Customer Support.

Invalid Signature or Certificate

Either this calculator does not have a certificate to run the application, or electrical interference caused a link to fail. Try to install the application again. If you continue to receive this error, contact [TI-Cares](#) Customer Support.

Other Errors

See pages B-6 through B-10 in the [TI-83 Plus manual](#) for information about the specific error or contact [TI-Cares](#) Customer Support.

Checking Version Numbers and Free Space

Verifying the Operating System Version and ID Number

The CellSheet™ application is compatible with TI-83 Plus operating system 1.13 and higher.

To verify your operating system version number:

1. From the home screen, press **[2nd] [MEM]**.
2. Select **ABOUT**.

The operating system version number is displayed below the product name and has the format x.yy. The ID number appears on the line below the product number.

Verifying the Flash Application Version

1. Press **[APPS]**.
2. Select **CelSheet**. The information screen is displayed.

The version number appears on the information screen below the application name.

Checking the Amount of Flash Application Free Space

1. From the home screen, press **2nd** [MEM].
2. Select **Mem Mgmt/Del**.

The CellSheet™ application requires at least 49,152 bytes of ARC FREE (Flash) to load the application.

For more information about memory and memory management, refer to the [TI-83 Plus manual](#).

Texas Instruments (TI) Support and Service Information

For General Information

E-mail: ti-cares@ti.com

Phone: 1-800-TI-CARES (1-800-842-2737)
For US, Canada, Mexico, Puerto Rico, and
Virgin Islands only

Home page: education.ti.com

For Technical Questions

Phone: 1-972-917-8324

For Product (Hardware) Service

Customers in the US, Canada, Mexico, Puerto Rico, and Virgin Islands: Always contact TI Customer Support before returning a product for service.

All other customers: Refer to the leaflet enclosed with your product (hardware) or contact your local TI retailer/distributor.

End-User License Agreement

Calculator Applications

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