Note 1A • Setting the Mode

Press MODE to display a screen like that shown here. The settings highlighted are the ones that you will use most often in this course. If your calculator does not display these settings, follow these steps to change them:
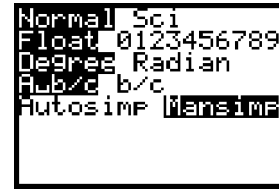
1. Use the arrow keys to highlight the setting you want to choose.

2. Press ENTER to register your selection.

3. When you have selected the settings you want, press 2nd [QUIT] to exit from the mode screen.

In this class you will need to change some of these settings during the year. The following comments may not mean much to you now, but your textbook will refer you back to this note several times during the course:

   a. Normal and Scientific each refer to the way in which numbers are displayed. Both modes are used in the chapter on exponents. Usually this setting should be on Normal mode.

   b. Float and 012… refer to other ways in which numbers are displayed. Float mode is useful in hiding long decimal answers and will make some numbers clearer. It is best to leave this setting on Float, except in applications such as money, where only two decimal places make more sense. Remember to change this setting back to Float when you are done.

   c. In this course you will use only the Degree mode. This setting is not important until you reach Chapter 11.

   d. A␣b/c and b/c each refer to the form in which fractions greater than 1 are displayed. A␣b/c means numbers will be displayed as mixed numbers. b/c means they will be displayed as improper fractions. In this course you can use either setting.

   e. Autosimp and Mansimp refer to whether or not a fraction is automatically reduced to its lowest terms. Usually this setting should be on Autosimp, unless you want to practice reducing fractions.

If you find that your screen looks strange when you try to do something, it's a good idea to look at the mode screen and check to see if any settings have been changed.
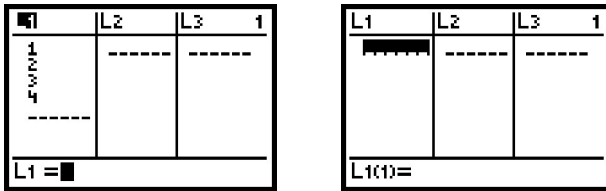
Note 1B • Entering Lists

There are six preset lists in the calculator: lists L1 through L6. You can create other named lists if needed. You can enter 999 elements into a list if enough memory is available.

(continued)

Clearing Data

If a list already has data in it, move the cursor up so that the list name is highlighted and press CLEAR ENTER.

Entering Data Directly into a List

Follow these steps to enter data (such as 400, 455, 390, 450, 360, 320, 480, 480) into a list:

    a. Press LIST.

    b. Enter each number into list L1. After entering each data value, press ENTER. When you are finished entering the data, press 2nd [QUIT]. If you wish to add a data value in the middle of the list, move the cursor to the place of insertion, press 2nd [INS], and then enter the number. To remove an entry from a list, highlight the entry and press DEL.
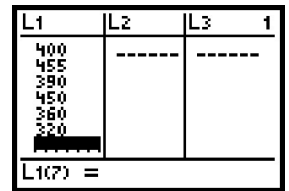
Entering Data into a List from the Home Screen

If you are working with a short list, you may want to enter it from the Home screen. To enter the data 1, 2, 3, 4 into list L1 from the Home screen, follow these steps:

    a. Press 2nd [CATALOG], arrow up to {, and press ENTER. (Braces can also be accessed from the text screen by pressing 2nd [TEXT].)

    b. Press 1 , 2 , 3 , 4.

    c. Press 2nd [CATALOG], arrow up to }, and press ENTER.

    d. Press STO▸ 2nd [STAT] 1 (L1) ENTER.

   **e.** You can check to see that the new data is in the list by pressing LIST.
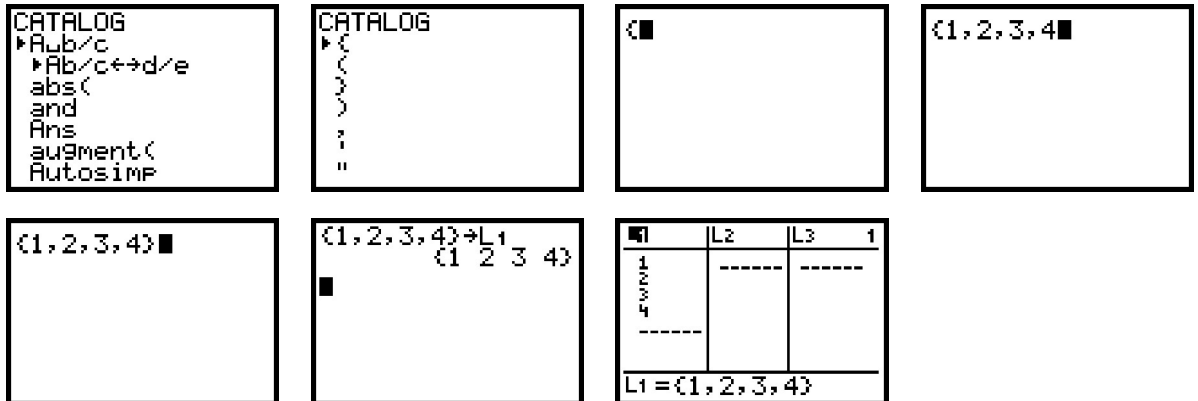
(continued)

You can also enter a list into the Home screen without storing it in a stat list.
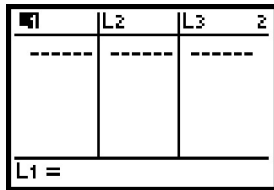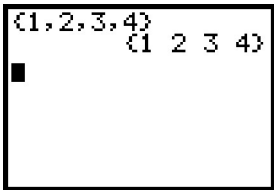
Naming a List

You can name a list on this calculator. Once you name a list, you can save it for later use. To name a list, highlight the name of any list—for example, L1, L2, and so on—and press 2nd [INS]. A new list will appear to the left of the list you highlighted. Enter the name of the list—for example, YEAR. (To enter a name press 2nd [TEXT], then use the arrows and ENTER to select each letter. A list name can have as many as five spaces, and it must start with a letter. The other spaces may be letters or numbers. Select **Done** and press ENTER when you complete the name to exit the text screen.) Press ENTER and you will see that the list now has a name.
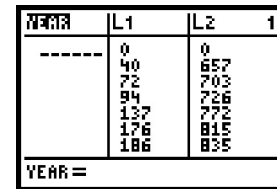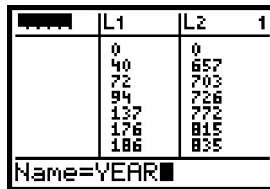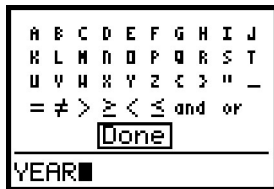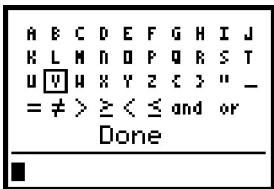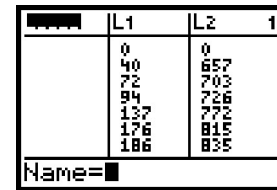
Deleting a List

To delete a list, press 2nd MEM 4 (**Delete…**) 3 (**List…**) and select the list you want to delete and press ENTER. If you press ENTER a second time, you will delete another list. You can delete a preset list or a named list. If you delete a list, you lose the data in the list. When you are finished deleting, press LIST.

Resetting a List

You can reset any of the preset lists (lists L1 through L6) that you previously deleted. But remember, the data in a deleted list is permanently lost. Press LIST and arrow up to the list name to the right of where you want the deleted list name to appear. Press 2nd [INS] 2nd [STAT] and select the list you want to reset. The list name will appear at the bottom of the List screen. Press ENTER.
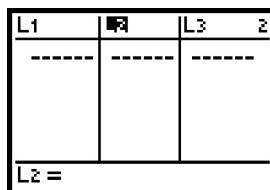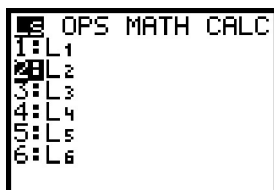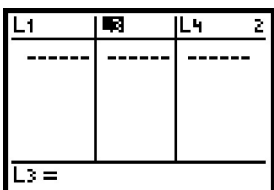
Categorical Lists

Categorical lists usually contain words or letters as data. If they contain numbers, the numerical value of the number is ignored and the symbol is treated as a letter. To define a categorical list, enclose the first entry in quotation marks. A small c appears in the list name to mark it as categorical.

(continued)
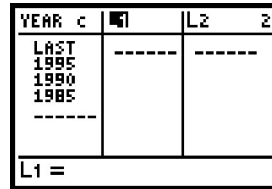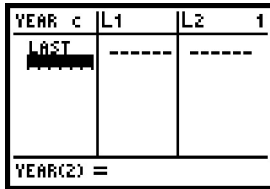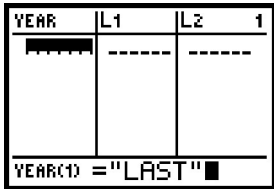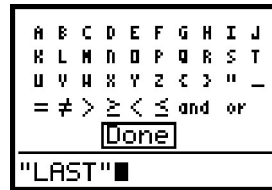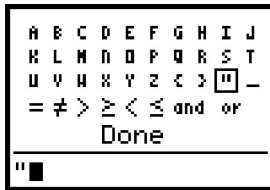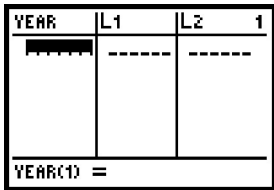
Moving a List

To move a list, begin by highlighting the name of an empty list. Press 2nd [STAT], arrow down to the name of the list you want to move, and press ENTER ENTER. The list data appear. You can now delete or overwrite the data in the original list, and the data will remain in the new list.
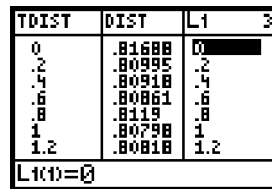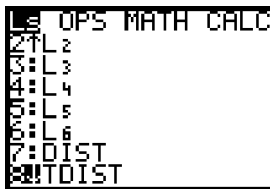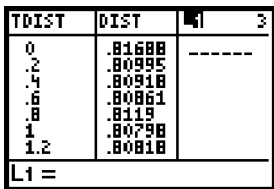
Note 1C • Mean, Median, and Mode

Enter data into a list, and return to the Home screen with 2nd [QUIT]. (See **Note 1B** if you don't remember how to enter data into a list. The screen here shows the same data as the first list entered in **Note 1B.**)

    a. Press 2nd [STAT] and arrow over to MATH.

    b. Select 3:mean(, 4:median(, or 5:mode(.
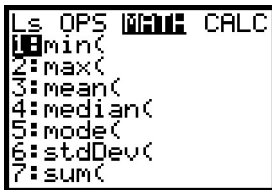
    c. Press 2nd [STAT], choose the list that contains the data, and close the parentheses.

    d. Press ENTER to find the value. If there is no mode you will get an ERR:NO MODE message.
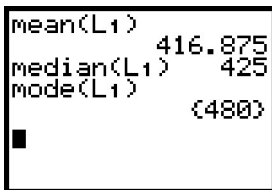
You can also calculate all the statistical values of a data set at once, including the median, mean, and the five summary values.

    a. Press $\boxed{\text{2nd}}$ [STAT] and arrow over to CALC.

    b. Select 1:1–Var Stats.

```
Ls OPS MATH CALC
1:1-Var Stats
2:2-Var Stats
3:Manual-Fit
4:Med-Med
5:LinReg(ax+b)
6:QuadReg
7:ExpReg
```
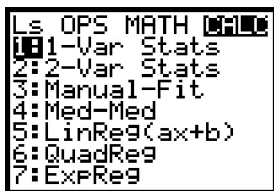
    c. Press $\boxed{\text{2nd}}$ [STAT] and choose whichever list contains the data.

```
1-Var Stats L1█
```
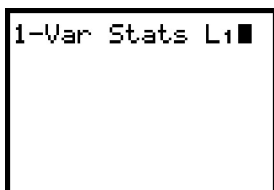
    d. Press $\boxed{\text{ENTER}}$.

Use the down arrow to display the entire list of values.

$\bar{x} = 416.875$	the mean
$\Sigma x = 3335$	the sum of the x-values
$\Sigma x^2 = 1414425$	the sum of the squares of the x-values
$Sx = 58.73290025$	the sample standard deviation
$\sigma x = 54.93959751$	the population standard deviation
$n = 8$	the number of data values
$minX = 320$	the minimum of the list
$Q1 = 375$	the first quartile
$Med = 425$	the median
$Q3 = 467.5$	the third quartile
$maxX = 480$	the maximum of the list

```
1-Var Stats
x̄=416.875
Σx=3335
Σx²=1414425
Sx=58.73290025
↓σx=54.93959751
n=8
```

```
1-Var Stats
↑n=8
minX=320
Q₁=375
Med=425
Q₃=467.5
maxX=480
```
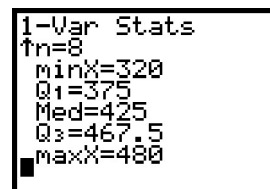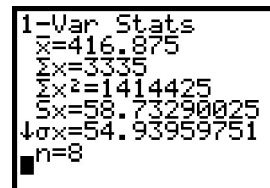
Errors

If you select 1–Var Stats and forget to enter the list name, the calculator default will be list L1. If you get ERR:INVALID DIM, you have selected a blank list.

Note 1D • Box Plots

Entering the Data

Enter the data set into a list. List L1 is used for this example. (See **Note 1B** if you need help entering data.)

```
L1      L2      L3      1
400    ------  ------
455
390
450
360
320
480
L1 =(400,455,390...
```
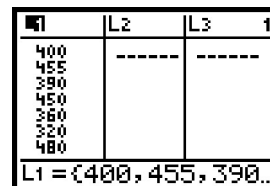
(continued)

Setting the WINDOW Values

Press WINDOW and enter the following values on the WINDOW screen.

Xmin = a number slightly less than the minimum of the data.

Xmax = a number slightly greater than the maximum of the data.

ΔX   is automatically set when Xmin and Xmax are set.

Xscl = the distance between tick marks. The number is not critical to graphing a box plot, but if it's too small, the tick marks will make the *x*-axis appear too thick.

Ymin = 0.

Ymax = 10. This number is not important for a box plot. Any number greater than Ymin will work.

Yscl = 0. This number does not affect a box plot.
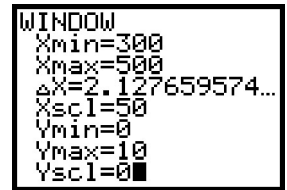
Displaying the Box Plot

This example uses the data in list L1, but you can choose any list.

a. Clear or turn off any equations in the Y= screen. (Press Y=. Place the cursor anywhere in an equation and press CLEAR to delete the equation. Or move the cursor over the highlighted equal sign of any equation you don't want to delete, and press ENTER to turn off the equation.)

b. Press 2nd [PLOT] 1 (Plot1...). (You can choose any of the three stat plots.)
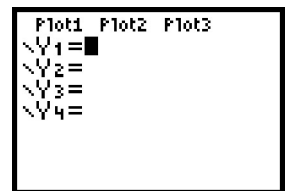
c. Select **On**, **Box Plot**, L1, **1**. Note that there are two types of box plots available. The second type will not connect outliers to the rest of the plot. The first type will. If you choose the second type, you will also have to indicate the mark you want to use for any outlying points.

d. Press GRAPH.
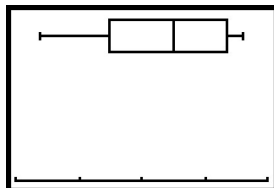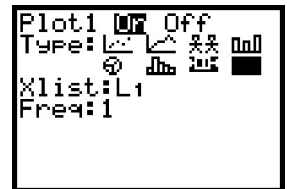
Tracing on a Box Plot

Press TRACE. The trace option allows you to see the five number summary values for the box plot by pressing the left and right arrows. If you press the up and down arrows, you move from one box plot to another. (See the **Graphing More Than One Box Plot** section that follows.) Look in the upper-left corner of the calculator screen to see which plot the calculator is tracing and which list contains the data. The trace option always starts with the stat plots and then moves to equations in the Y= screen (if any are turned on) even if you can't see them in the current window. Be sure to turn off any plots and any equations you do not want to see or trace.
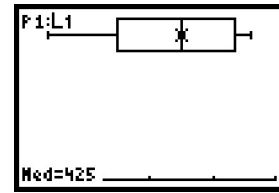
Graphing More Than One Box Plot

The calculator can graph up to three box plots at once. Follow the directions for making a box plot and set up Plot2, Plot3, or both. Be sure the list in which you've entered the data matches the list you select when setting up each box plot.

Errors

If you don't see a graph, check the Xmin and Xmax values to make sure that your data lie between them. If you get ERR:INVALID DIM when you try to graph, you have selected a blank list. If you get ERR:WINDOW RANGE, you have probably assigned an Xmax value that is less than the Xmin value or a Ymax value that is less than the Ymin value.

Clean-up

When you are finished graphing box plots, you might want to turn off all the plots so they don't interfere with other graphing screens. Press 2nd [PLOT] 4 (**Plotsoff**) ENTER or press Y=, arrow to any plot that is highlighted, and press ENTER.

Note 1E • Histograms

Entering the Data

Enter the data into a list. List L1 is used for this example. (See **Note 1B** if you need help entering the data.)

Setting the WINDOW Values

Press WINDOW and enter the following values into the WINDOW screen:

Xmin = a number slightly less than the minimum of the data.

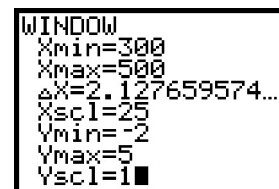Xmax = a number slightly greater than the maximum of the data.

ΔX is automatically set when Xmin and Xmax are set.

Xscl = the width of each bar. Use an integer value that is approximately equal to $\frac{Xmax - Xmin}{8}$.

(continued)

Ymin = -2. Using a negative value for Ymin allows you to trace on the
graph without the trace values interfering with the graph itself.

Ymax = the height of the tallest bar. Make an intelligent guess. You may have
to revise this value when you look at the graph. Tracing on the
graph can help you determine the maximum bar height.

Yscl = the distance between tick marks on the y-axis. The number you
choose will depend on the Ymax value. You don't want tick marks
that are too close together, or the y-axis will appear too thick.

The Xscl value determines the width of the histogram bars. You may need to
extend your range one bar-width beyond where you think it should be by
increasing the Xmax value. You may want to create a histogram with as few as
5 or as many as 10 bars. Experiment with different values for Xscl to see what
effect each has on the graph.

Displaying the Histogram

This example assumes the data is in list L1, but you can choose any list.

a. Clear or turn off any equations in the Y= screen. (Press Y= . Place the
cursor anywhere in an equation and press CLEAR to delete the equation.
Or move the cursor over the highlighted equal sign of any equation
you don't want to delete, and press ENTER to turn off the equation.)

b. Press 2nd [PLOT] 1 (**Plot1...**). (You can choose any of the three stat plots.)

c. Select **On**, **Histogram**, **L1**, **1**.
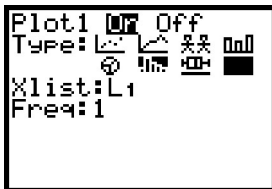
d. Press GRAPH .

Tracing on a Histogram

Press TRACE. The trace option always starts with the stat plots and then moves to equations on the Y= screen (if any are turned on), even if you can't see them in the current window. Be sure to turn off any plots and any equations you do not want to see or trace.
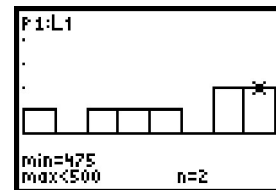
Errors

You will get ERR:STAT if you try to create a histogram with more than 47 intervals (bars). Make the Xscl value larger to correct this error. You may also get an error message if you haven't turned off a plot you're not interested in seeing or you have changed the data or the window settings.

Clean-up

When you are finished graphing a histogram, you might want to turn off all the plots so they don't interfere with other graphing screens. Press 2nd [PLOT] 4 (**PlotsOff**) ENTER or press Y=, arrow to any plot that is highlighted, and press ENTER.

Note 1F • Scatter Plots

Entering the Data

Enter the x-coordinates (horizontal axis) into one list and the y-coordinates (vertical axis) into another list. List L1 and list L2 are used for this example. (See **Note 1B** if you need help entering the data.)

Setting the WINDOW Values

Press WINDOW and enter the following values into the WINDOW screen.

Xmin = a number less than the minimum value in the list of x-coordinates.

Xmax = a number greater than the maximum value in the list of x-coordinates.

ΔX   is automatically set when Xmin and Xmax are set.

Xscl = the distance between tick marks. You can use 0 (no tick marks) or a value usually less than or equal to $\frac{Xmax - Xmin}{10}$. If your Xscl value is too small, the x-axis will appear too thick.

Ymin = a number less than the minimum value in the list of y-coordinates.

Ymax = a number greater than the maximum value in the list of y-coordinates.

Yscl = the distance between tick marks. You can use 0 (no tick marks) or a value usually less than or equal to $\frac{Ymax - Ymin}{10}$. If your Yscl value is too small, the y-axis will appear too thick.

(continued)

Displaying the Scatter Plot

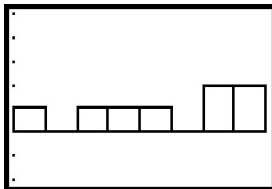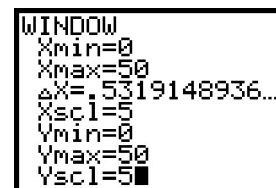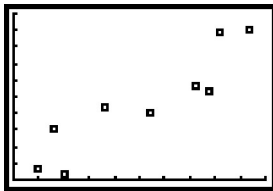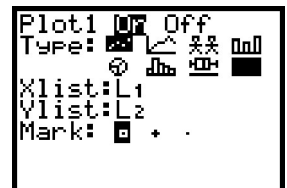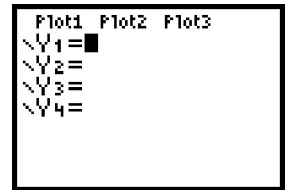**a.** Clear or turn off any equation in the Y= screen. (Press Y=. Place the cursor anywhere in an equation and press CLEAR to delete the equation. Or move the cursor over the highlighted equal sign of any equation you don't want to delete, and press ENTER to turn off the equation.)

b. Press 2nd [PLOT] 1 (Plot1...). (You can choose any of the three stat plots.)

c. Select On, ScatterPlot, L1 for Xlist (if your *x*-coordinates are in list L1), L2 for Ylist (if your *y*-coordinates are in list L2), and choose a mark type to indicate the data points.

d. Press GRAPH.

Tracing on a Scatter Plot

Press TRACE. The trace option always starts with the stat plots and then moves to equations in the Y= screen (if any are turned on) even if you can't see them in the current window. Be sure to turn off any plots or any equations you do not want to see or trace.
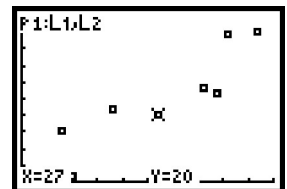
Graphing More Than One Scatter Plot at a Time

The calculator can graph up to three scatter plots at the same time. Follow the directions for displaying a scatter plot, and set up Plot2, Plot3, or both. Be sure the lists in which you've entered the data match the lists you select when setting up each scatter plot. Be sure to choose a different mark for each plot.

Errors

An ERR:DIM MISMATCH message means that the two lists do not have the same number of entries. The same error message could appear if you left a plot on that you're not using, or if you named the wrong list when you set up the scatter plot.

If the graph does not look as you think it should, try the following: Clear or turn off all equations in the Y= screen. Press 2nd [FORMAT] and select GridOff.

(continued)

Discovering Algebra Calculator Notes for the Texas Instruments TI-73 **17**

Clean-up

When you are finished graphing scatter plots, you might want to turn off all the plots so they don't interfere with other graphing screens. Press [2nd] [PLOT] [4] (**PlotsOff**) [ENTER] or press [Y=], arrow to any plot that is highlighted, and press [ENTER].

Note 1G • POINTS Program

Link or manually enter the program into your calculator. (See **Note 0F** or **Note 0G.**) The POINTS program plots a single point in a graphing window that measures from −4.7 to 4.7 on the horizontal axis and from −3.1 to 3.1 on the vertical axis. You identify and enter the coordinates of the point rounded to the nearest 0.5 unit.

   a. To execute the program, press [PRGM], arrow to POINTS, and press [ENTER].
   b. Study the screen and determine the coordinates of the marked point, and then press [ENTER].
   c. Enter the *x*-coordinate, press [ENTER], then enter the *y*-coordinate, and press [ENTER] again.
   d. If you are correct, the calculator tells you.
   e. If you enter the wrong coordinates, by pressing [ENTER] you can look at the graph again and repeat **steps b** and **c**.
   f. If you enter the wrong coordinates a second time, the calculator will display the correct answer.
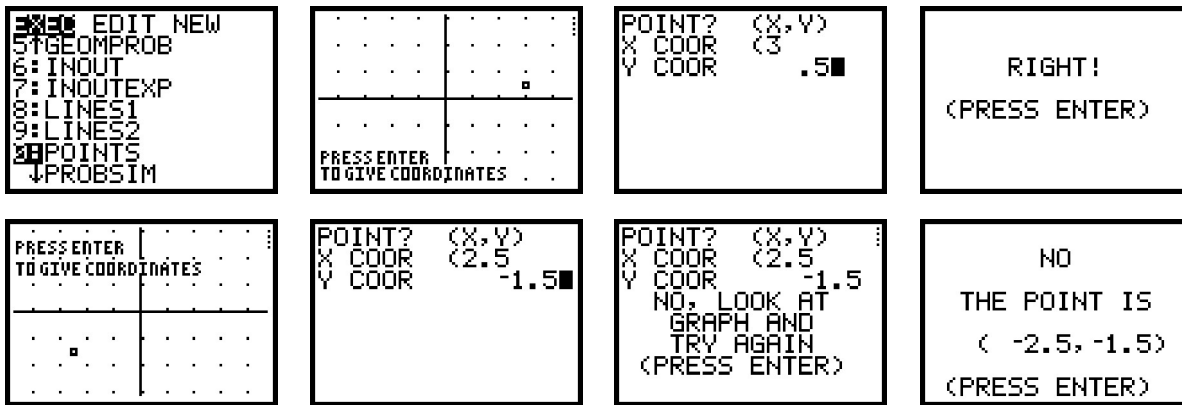
Errors

If you get ERR:SYNTAX, select **1:Quit** and start the program over by pressing [ENTER].

Clean-up

If you quit POINTS without completing the program, you will be left with **Plot1** and the screen grid turned on. Press [2nd] [PLOT] [4] (**PlotsOff**) [ENTER], or press [Y=], arrow up to **Plot1**, and press [ENTER] to turn off **Plot1**. Then press [2nd] [FORMAT] and select **GridOff**.

(continued)

```
PROGRAM:POINTS            If fPart(T)=0            Text(V,6," (PRESS ENTER)"
3→W                       N→T                     0→W:Pause
Lbl 1                     Else                    Goto 4
PlotsOff :FnOff           If K=103:Then           Else:If W=1
GridOn                    Text(V,H,".")           Then
randInt(-9,9,1)/2→L₁      H+2→H                   ClrScreen
randInt(-6,6,1)/2→L₂      T+.5→T                  Text(48,0,"NO, THE POINT
Plot1(Scatter,L₁,L₂,▫)    Else                        IS")
ZDecimal                  If K=104:Then           Text(48,57,"(")
Lbl 3:47→Q                -1→S                    Text(48,60,X)
60→H:54→V                 Text(V,H,"-")           64+4(X<0)+6(fPart(X)≠0)
Text(V,6,"ENTER POINT")   H+4→H                       →H
1→S:0→T:0→U               Else                    Text(48,H,",")
Text(V,H-3,"(?  ")        If K=81:Then            Text(48,H+3,Y)
Repeat U=1                ST→P:1→S:0→T            H+7+4(Y<0)+6(fPart(Y)≠0)
10→N                      Text(V,H,",")               →H
getKey→K                  H+3→H                   Text(48,H,")")
If K=24:1→U               Else                    Text(V,6,"(PRESS ENTER)"
If K>71 and K<75          If K=64 or K=105:Then   Pause
K-65→N                    Text(V,H,")")           Goto 4
If K>81 and K<85          ST→Q                    Else:1→W
K-78→N                    (K=105)→U               Text(48,6,"NO, TRY
If K>91 and K<95          End:End:End                 AGAIN")
K-91→N                    End:End:End             Text(V,60,"?  ")
If K=102:0→N              If Q=47:Goto 3          Goto 3
If N<10:Then              L₁(1)→X:L₂(1)→Y         Lbl 4
Text(V,H,N)               If P=X and Q=Y:Then     ClrScreen:PlotsOff
H+4→H                     Text(48,6,"    RIGHT!  "
```

Note 1H • Connecting the Points

The xyLine connects a sequence of points with line segments. The order in which the points are connected is the order in which the coordinates appear in the lists. Enter data and set the window as described in **Note 1F.**

Displaying Connected Points

   **a.** Clear or turn off any equations in the Y= screen. (Press ⎡Y=⎤. Place the cursor anywhere in an equation and press ⎡CLEAR⎤ to delete the equation. Or move the cursor over the highlighted equal sign of any equation you don't want to delete, and press ⎡ENTER⎤ to turn off the equation.)

   **b.** Press ⎡2nd⎤ [PLOT] ⎡1⎤ (Plot1...). (You can choose any of the three stat plots.)
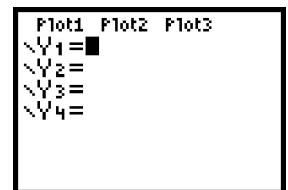
(continued)

   c. Select **On**, **xyLine**, L1 for **Xlist** (if your *x*-coordinates are in list L1), L2 for **Ylist** (if your *y*-coordinates are in list L2), and choose a mark type to indicate the data point.

   d. Press GRAPH.
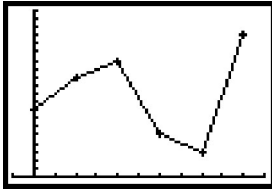
If the points are not listed in ascending order by their *x*-coordinates, your **xyLine** will be scrambled with segments crisscrossing each other. To reorder your points correctly, go to the Home screen and press 2nd [STAT], arrow to **OPS**, and press 1:**SortA(**. Complete the command **SortA(L1,L2)** and press ENTER. Notice that the sort command puts list L1 in ascending order but maintains the original pairings between list L1 and list L2. (See **Note 10B.**)

Tracing Connected Points

Press TRACE. The trace option always starts with the stat plots and then moves to equations in the **Y=** screen (if any are turned on), even if you can't see them in the current window. Be sure to turn off any plots and any equations you do not want to see or trace.
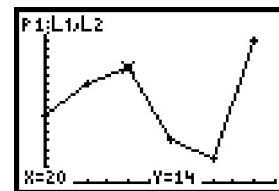
Errors

An **ERR:DIM MISMATCH** message means that the two lists do not have the same number of entries. The same error message could appear if you left a plot on that you're not using, or if you named the wrong list when you set up the **xyLine**.

If the graph does not look as you think it should, try this: Clear or turn off all equations in the **Y=** screen. Press 2nd [FORMAT] and select **GridOff**.

Clean-up

When you are finished with the **xyLine**, you might want to turn off all the plots so they don't interfere with other graphing screens. Press 2nd [PLOT] 4 (**PlotsOff**) ENTER or press Y=, arrow to any plot that is highlighted, and press ENTER.

Note 1I/App • Reading a Distance Using the CBL/CBR App

You will need a CBR (Calculator-Based Ranger).

Connect the CBR to the calculator. Press APPS and select **CBL/CBR**. Press any key to continue. Select 1:**GAUGE**. Select **Sonic** (which sets the calculator to read distance), **Bar**, **m**, and **Off**. Select **GO**…. The calculator will display a continuous reading of the distance from the probe to the nearest object in front of it.

(continued)
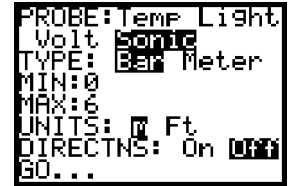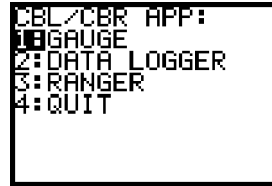
Press ON to return to the setup screen. (This may take a few seconds.) Then press 2nd [QUIT] to return to the CBL/CBR App main menu. Select 4:QUIT to return to the Home screen.

Note 1J • Equations

To graph an equation on your calculator, the equation must be in the form $y =$ "some expression." If the equation contains variables other than x and y, you need to rewrite it using only x and y as variables.

   a. Press Y=.

   b. Enter the equation using the variable x. Press X to enter the variable x.
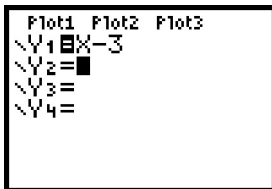
   c. Setting a window for graphing equations is not as easy as setting a window for data. If it is an application problem, think about what values make sense for both x and y. You may need to try different windows to find one that is appropriate.
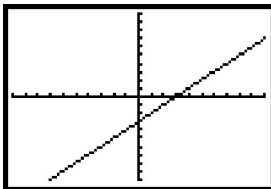
   d. Press GRAPH.

Tracing Equations and Plots on the Same Graph

Enter the data and set up a scatter plot. Enter the equation. Set the window. You can do these three steps in any order. When you press GRAPH, you will see the stat plot graphed first and the equation(s) graphed second. When you press TRACE, you will first trace the data in the stat plot. Press the down arrow to trace other stat plots if they are turned on. By arrowing down again you will trace any equations that are turned on. Note the label in the upper-left corner of the screen. The label P1:L1,L2 indicates that you are tracing Plot1 and the data are in lists L1 and L2. When you are tracing an equation, the equation is displayed. If you do not want the labels displayed, press 2nd [FORMAT] and select ExprOff.
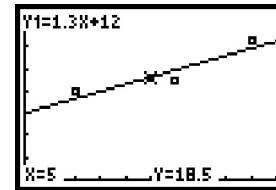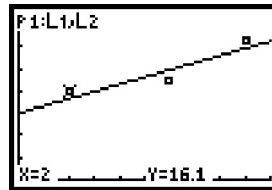
(continued)

Errors

If you get an ERR:DIM MISMATCH message, turn off the stat plots by pressing
2nd [PLOT] 4 (PlotsOff) ENTER . If you see ERR:SYNTAX, check your equation and
count the number of left and right parentheses to make sure they match. Look
for numbers with two decimal points. Check that you used the negative or
subtraction sign correctly. If you see the graph screen but nothing appears, you
might have a problem with your equation or your window. Try changing one or
both of these.

Note 1K • Formula-Generated Lists

Enter the data into a list as in **Note 1B.** Move the cursor to the next list, arrow
up to highlight the list name, and press ENTER . Enter the formula for the
operations you wish to perform. For example, if list L2 is defined as list L1
plus 47, highlight the name L2, press ENTER , and then press 2nd [STAT] 1 :L1 +
4 7 ENTER . If you get an error message, select 2:Goto and press CLEAR . Make sure
you are on the name of the list before you enter the list operation. You can do
operations with list variables the same way you do with numbers. You can add,
subtract, multiply, divide, or do any other mathematical operation.

For another example, let list L1 be rectangle lengths and let list L2 be the
corresponding widths. Move the cursor so that it highlights list L3 and enter the
formula for the area of a rectangle, L1 $*$ L2. Press ENTER .

List Formulas

If you enclose a formula in quotation marks (press 2nd [TEXT] to access
quotation marks), the entries of the new list will automatically update if you
change the values in the list referred to in the formula. For example, let list L1 be
2, 3, 4 and define the name of list L2 to be 3 $*$ L1. Notice the mark to the right of
list L2 that indicates a formula name. Now edit one of the entries in list L1—for
example, change the 3 to 5. Notice that the second entry in list L2 automatically
updates to 15.

(continued)

L1	▉▉	L3 2
2		------ ------
3		
4		

L2="3*L1"▉		

L1	L2 ◆	L3 2
2	▉▉	------
3	9	
4	12	
------	------	
L2(1) =6		

L1	L2 ◆	L3 1
2	6	------
▉▉	9	
4	12	
------	------	
L1(2) =5▉		

L1	L2 ◆	L3 1
2	6	------
5	15	
▉▉	12	
------	------	
L1(3) =4		

To delete a formula, move up to the list name and press ENTER. Then press CLEAR once to remove the formula but keep the list values. Press ENTER. Repeat this process a second time to remove the list values.

Errors

You will get an error if you clear a list that is used in defining a formula-generated list. Select 2:**Goto** and press CLEAR.

Note 1L/App • Matrices

Matrices on this calculator are available only through a special applications program. You must download the application, MATRICES.APP, either from Texas Instruments' website (education.ti.com) or from another calculator. MATRICES is an application, not a program. To download the application from another calculator, on the sending calculator press APPS 1 (**Link...**), arrow down and select **Apps...**, then select MATRICES.APP. Then proceed as if you were sending a program. (See **Note 0F.**)

```
APPLICATIONS
1▉Link…
2:CBL/CBR
3:MATRICES
```

```
SEND RECEIVE
5:Pic…
6:Real…
7:Y-Vars…
8:Consts…
9:Vars to TI82…
0:Vars to TI83…
▉:Apps…
```

```
SELECT TRANSMIT
 CBL/CBR  APP
▶MATRICES APP
```

To access the MATRICES application once it is installed, press APPS, select MATRICES, and press ENTER. You are now on the **MatrixMenu** screen. Within the application you are able to work with matrices on a special **MatrixHome** screen. To switch from the **MatrixMenu** screen to the **MatrixHome** screen, press CLEAR. To switch back to the **MatrixMenu** screen, press APPS. To exit the MATRICES application and return to the regular Home screen, press 2nd [QUIT]. You cannot import matrices to the regular Home screen.

```
APPLICATIONS
1:Link…
2:CBL/CBR
3▉MATRICES
```

```
MatrixMenu   Quit=ExitApp
NAME MTH EDT HLP
1▉[A]
2:[B]
3:[C]
4:[D]
5:[E]
6:[F]
```

```
MatrixHome   Apps=Menu
▉
```

(continued)

Entering a Matrix

The MATRICES application allows you to work with up to six matrices, [A], [B], ..., [F], listed on the MatrixMenu screen. To define and store a matrix, [A] for example, start on the MatrixMenu screen, arrow to EDT and select 1:[A]. The dimensions of a matrix are given as *r* × *c*. Enter the first dimension, the number of rows, and press ENTER. Then enter the second dimension, number of columns, and press ENTER. Notice that as you press ENTER after each dimension, the matrix on the screen adjusts in size. On this calculator, matrix dimensions are limited to 99 rows or 99 columns, but a matrix cannot contain more than 100 cells.

After you enter the dimensions, the cursor jumps to row 1, column 1. Enter the value and press ENTER. The cursor moves across the first row and then down to the next row. Continue to enter values and to press ENTER after each entry. The current position of the cursor and the cell value are shown by *r, c = value* in the lower-left corner of the screen. You can edit any entry by arrowing to the position and reentering the value.

Complete matrix [A] as in the first two screens shown here. After you have entered all of the values, press APPS to store the matrix and to return to the MatrixMenu screen. Notice that the dimensions are listed beside [A]. On the MatrixMenu screen, any matrix that shows dimensions is defined.
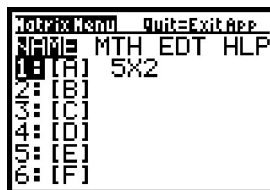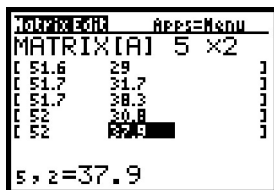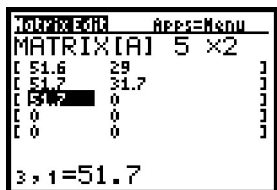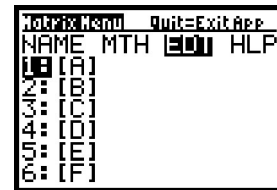
Displaying a Matrix

Matrices are displayed on the MatrixHome screen. To display [A], choose 1:[A] on the MatrixMenu screen and press ENTER. The name, [A], appears on the MatrixHome screen. Press ENTER again and the complete matrix is displayed. To return to the MatrixMenu screen, press APPS.
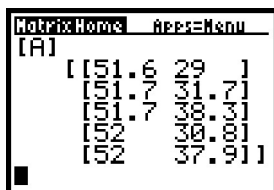
If you want a matrix to represent money, you can set the calculator so that all numbers show two decimal places. To quit the MATRICES application, press 2nd [QUIT]. Then to change the mode, press MODE, and select 2 on the second line. Return to the MATRICES application and display [A] on the MatrixHome screen.
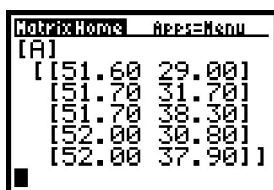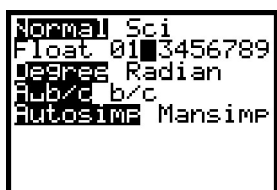
Deleting a Matrix from the Calculator

You can always change a matrix by arrowing to EDT in the MatrixMenu screen and selecting the matrix you want to change. You might, however, want to conserve memory and delete a matrix completely from your calculator. To delete a matrix, you must exit the MATRICES application. Press [2nd] [QUIT] to exit the application. Then press [2nd] [MEM] and select 4:Delete...; then 9:AppVars.... [A] is listed as MATA, [B] as MATB, [C] as MATC, and so on. Arrow to the matrix you want to delete and press [ENTER]. Press [2nd] [QUIT] to return to the Home screen.
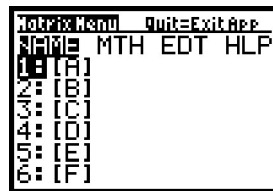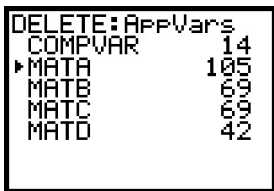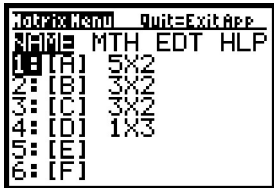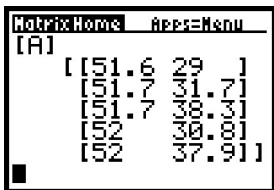
Errors

If you get an ERR:MEMORY message, you've tried to enter matrix dimensions that define more than 100 cells.

An ERR:UNDEFINED message probably indicates that you have named a matrix that is not defined.

Note 1M/App • Multiplying a Matrix by a Number

To multiply a matrix by a number, multiply each cell value of the matrix by the number. For example, if [A] is the matrix from **Note 1L/App,** to multiply [A] by 50, enter 50 ✳ [A] or 50[A] on the MatrixHome screen and press [ENTER]. The matrix answer appears on the screen.

Multiplying a number by a matrix, [A] ✳ 50 for example, is done in the same way.

Errors

An **ERR:UNDEFINED** message probably indicates that you have named a matrix that is not defined.

Note 1N/App • Adding/Subtracting Matrices

To add or subtract two matrices, the matrices must have the same dimensions. Define [B] to have dimensions 3 × 2, and enter these values (see **Note 1L/App**):

   1, 1 = 8.9   1, 2 = 9.1

   2, 1 = 2.35   2, 2 = 2.65

   3, 1 = 1.5   3, 2 = 1.6

Define [C] to have dimensions 3 × 2, and enter these values:

   1, 1 = 2.5   1, 2 = 2.25

   2, 1 = 1   2, 2 = 1.25

   3, 1 = .65   3, 2 = .5

On the **MatrixHome** screen, enter [B] + [C] and press ENTER . The matrix showing on the screen is the sum of [B] and [C].

Errors

If you get **ERR:DIM MISMATCH**, you've tried to add (or subtract) two matrices that don't have the same dimensions.
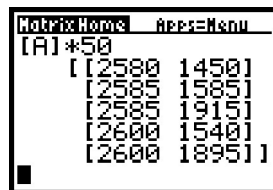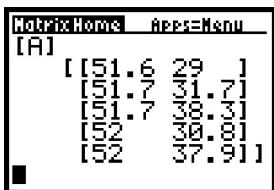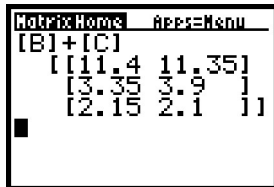
An **ERR:UNDEFINED** message probably indicates that you have named a matrix that is not defined.

Note 1P/App • Multiplying Two Matrices

To multiply two matrices, the number of columns in the first matrix must match the number of rows in the second. For example, if the first matrix has dimensions 1 × 3 and the second matrix has dimensions 3 × 2, the three columns of the first matrix match the three rows of the second. The multiplication will be defined.

Enter [D] and [C] as shown in the screens here. (See **Note 1L/App.**)

(continued)

Display [D] [C] (or [D] ✳ [C]) on the **MatrixHome** screen and press ENTER. The product appears on the screen. The dimensions of the product are (*the number of rows of the first matrix*) × (*the number of columns of the second matrix*). In this example, a 1 × 3 matrix times a 3 × 2 matrix has a 1 × 2 answer.
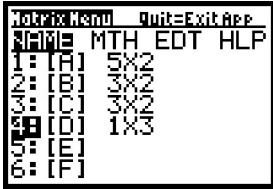
Errors

If you get **ERR:DIM MISMATCH**, then the number of columns in the first matrix does not match the number of rows in the second.

An **ERR:UNDEFINED** message probably indicates that you have named a matrix that is not defined.

## Note 1Q • Pictographs

Entering the Data

A pictograph requires one categorical list and one data list. The two lists must be the same length and can have seven elements at most. In this example, list L1 is the categorical list and list L2 is the data list. (See **Note 1B** if you need help making a list.)

Displaying the Pictograph

a. Press 2nd [PLOT] and select **Plot1....** (You can use any plot you want.)

b. Turn the plot on.

c. Under **Type** select the third option.

d. Under **CategList** enter L1.

e. Under **Data List** enter L2.

f. Under **Scale** enter 2. The **Scale** is the data value represented by each picture symbol. The maximum allowable number of symbols in any category is seven. As you increase the scale number, the number of picture symbols in each category decreases. Any fractional part of a category will appear as half of a picture symbol, even if it really should be some other fractional part. That is, if the scale is set as 4, a category with a data value of 1, 2, or 3 would be represented by half a picture symbol, and a data value of 5, 6, or 7 would be represented by one and a half picture symbols.

g. Select **Hor** for a horizontal graph. (You can also choose a vertical graph.)

h. Under **Icon** select the first option. (You can use any symbol you want.)

i. Press GRAPH.
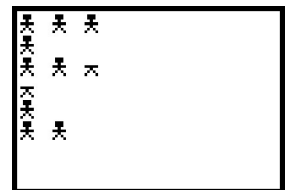
(continued)

Tracing on a Pictograph

Press ⌐TRACE⌐ and use the arrow keys to display the name and data value of
each category. Because half of a picture symbol may represent different
values, you cannot tell the exact data value in a category unless you use trace.
Hint: If your maximum data value is 14 or less, set the scale as 2. Then you
can tell the exact data value from the graph without using ⌐TRACE⌐. The trace
option always starts with the **stat plots** and then moves to equations in the
Y= screen (if any are turned on), even if you can't see them in the current
window. So be sure to turn off any plots and any equations you do not want
to see.
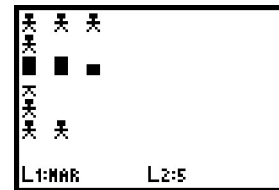
Errors

ERR:INVALID DIM indicates that you have too many categories. ERR:MISMATCH
occurs if the categorical list and the data list do not have the same number of
elements. ERR:SCALE indicates that your scale is too small and your graph
requires more than seven picture symbols. Increase your scale.

Note 1R • Bar Graphs

Entering the Data

A bar graph requires one categorical list and one, two, or three data lists. All the
lists must be the same length and can have seven elements at most. In this
example, list L1 is the categorical list and lists L2 and L3 are the data lists.
(See **Note 1B** if you need help making a list.)

Displaying the Bar Graph

    a. Press ⌐2nd⌐ [PLOT] and select **Plot1…**. (You can use any plot you want.)

    b. Turn the plot on.

    c. Under **Type** select the fourth option.

    d. Under **CategList** enter L1.

    e. Under **DataList1** enter L2, and under **DataList2** enter L3. Under **DataList3**
        enter any list because in this example we don't use **DataList3**.

    f. Select **Hor** for a horizontal graph. (You can also choose a vertical graph.)

    g. Select 1, 2, or 3 to indicate how many data lists you want graphed.
        Selecting 1 will graph only **DataList1**; selecting 2 will graph **DataList1** and
        DataList2; and selecting 3 will graph all three lists. For this example, select 2.
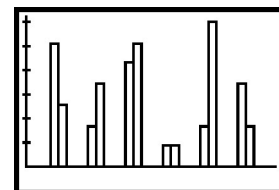
    h. Press ⌐GRAPH⌐.

Tracing on a Bar Graph

Press ⌐TRACE⌐ and use the arrow keys to display the name and data value of each
category. The scale along the data axis is automatically adjusted to fit the data
range you are displaying. The trace option always starts with the **stat plots** and
then moves to equations in the Y= screen (if any are turned on), even if you
can't see them in the current window. So be sure to turn off any plots and any
equations you do not want to see.
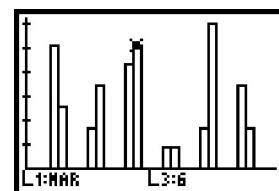
Errors

ERR:INVALID DIM indicates that you have too many categories. ERR:MISMATCH
occurs if the lists you are using do not have the same number of elements.