## CASIO.

## QUICK START GUIDE

## fx-CG50



fx-CG50

The status bar will display messages and current status like battery level, angle mode, fraction results, complex mode, or input/output settings.

The function keys allow you to access the tab (soft key) menus that appear at the bottom of the screen. When an (>) appears above the  $\mbox{$\sqcup$}$  key, selecting  $\mbox{$\sqcup$}$  will offer more on-screen choices.

The p key displays every mode the calculator has. To select a mode, press p to the desired icon and press or press the number or letter in the upper right hand corner of the icon.

The d key operates like the back arrow on a web browser; it will take you back one screen each time you select it. The d key will not take you to the icon menu.

The L key activates any function displayed on or above the calculator buttons that is yellow. For example, to find the square root of a number, you would need to press L, then S. L5gives you access to on-screen color formatting.

The Okey will power the unit on. To turn the unit off, press  $\bot$  O.

The a key activates any function displayed on or above the calculator buttons that is in red. For example, to type the letter A, press a, then f.

The I key executes operations. When data is entered, the I button must be pressed to store the data.



#### The following explains the meaning of each icon on the fx-CG50 icon menu

#### **Icon Menu Name Description**



**RUN-MATRIX** This icon menu is used for general computations, including binary, octal, decimal, and hexadecimal functions and matrices.



**STATISTICS** 

This icon menu is used to perform single-variable (standard deviation) and paired variable (regression) statistical calculations, to perform tests, to analyze data and to draw statistical graphs.



This icon menu lets you input text, math expressions, and other data in a notebook-like interface. **eACTIVITY** Use this mode when you want to store text, formulas, or built-in application data in a file.



**SPREAD-** This icon menu is used for creating spreadsheets.



**GRAPH** This icon menu is used to draw, store and calculate information from functions.



DYNAMIC GRAPH

This icon menu is used to store graph functions and to draw multiple versions of a graph by changing the values assigned to the variables in a function.



This icon menu is used to store functions, to generate a numeric table of different solutions **TABLE** as the values assigned to variables in a function change, and to draw graphs.



**RECURSION** This icon menu is used to store recursion formulas, to generate a numeric table of different solutions as the values assigned to variables in a function change, and to draw graphs.



CONIC GRAPH

This icon menu is used to graph parabolas, circles, ellipses, and hyperbolas. Conic sections can be inputted as rectangular functions, polar coordinates, or parametric functions for graphing.



This icon menu is used to solve linear equations with two through six unknowns, **EQUATION** and high-order equations from 2nd to 6th degree.



#### The following explains the meaning of each icon on the fx-CG50 icon menu

#### **Icon Menu Name Description**



**PROGRAM** This icon menu is used to store programs in the program area and to run programs.



**FINANCIAL** This icon menu is used to perform financial calculations and to draw cash flow and other types of graphs.



This icon menu is used to control the optionally available EA-200 Data Analyzer. For information **E-CON4** about this icon menu, download the E-CON manual from http://edu.casio.com.



LINK This icon menu is used to transfer memory contents or back-up data to another unit or PC.



**MEMORY** This icon is used to manage data stored in memory.



This icon menu is used to initialize memory, adjust contrast, reset memory, and to manage **SYSTEM** other system settings.



**GEOMETRY** This icon menu allows you to draw, analyze and animate geometric objects.



PICTURE PLOT

This icon menu allows you to plot points (that represent coordinates) on the screen and then perform various analysis based on the plotted data.



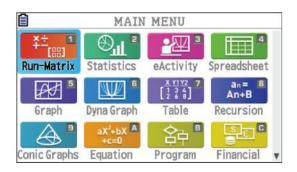
3D GRAPH This icon menu allows you to draw 3-dimensional graphs.

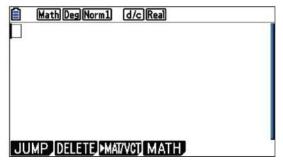


**CONVERSION** 

This icon menu indicates the "Metric Conversion' add-in application is installed. To do conversions, go to the Run-Matrix icon and press i.

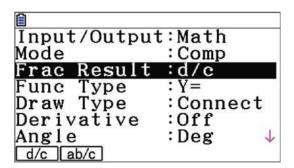
## **RUN-MATRIX**





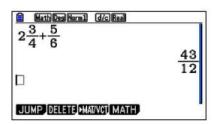
To select how certain commands and results will be interpreted or displayed, press Lp(SET UP). For Input/ Output, select Math for natural display of fractions, radicals and other expressions. For Frac Result, select d/c for a fraction result as the default or ab/c for a mixed number as the default. For Angle, select Deg or Rad for degrees or radians.

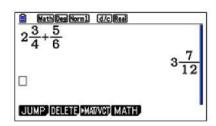
Note: the status bar at the top of the screen displays the selection for some of these options.

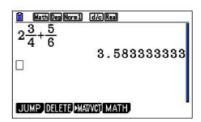


1. Evaluate 
$$23 + \frac{5}{4}$$
.

Press Lb(...) jc C4C+b5cEl. To see the result as a mixed number, press Lv(a--4). To see the result as a decimal, press v.

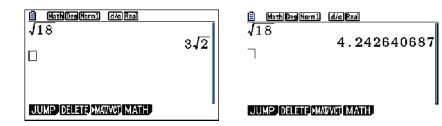






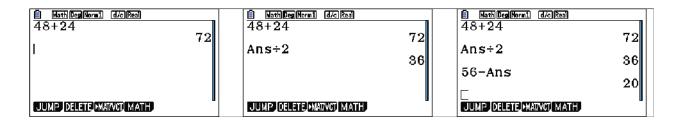
#### 2. Simplityis

Press LsS18I. To see the result as a decimal, press v.



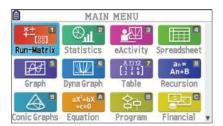
3. Add 48 and 24. Then, divide by 2. Finally, subtract from 56.

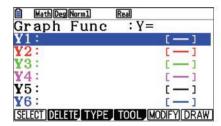
The purpose of this example is to demonstrate the Ans key. Ans represents the previous answer. Press 48+24l. Then, press M2l. Ans appears automatically when an operation symbol is pressed. However, Ans has to be pressed for the subtraction part. Press 56-Ln(Ans)l.

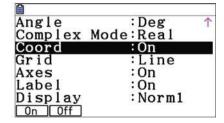


To construct graphs and use graphical analysis commands, use the Graph menu. From the Main Menu, press 5.

The first screen is the function/relation editor. To select how certain results will be displayed, press Lp (SET UP). The suggested selections for Coord, Grid, Axes and Label are shown. Scroll down to these selections. To make a change, highlight the item and use the function button that appears directly below the desired tab. For example, when Coord is highlighted, q(On) will turn coordinates on and w(Off) will turn coordinates off. Press d to return to the editor.



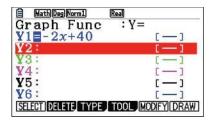


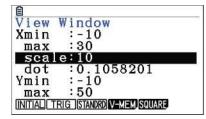


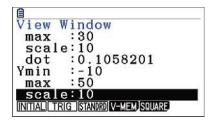
The Math Club plans to sell t-shirts. Previous experience suggests that the number of t-shirts sold depends on the price. A good model for the number sold, y, as a function of the price, x, is y = -2x + 40.

#### 1. Construct a graph of this equation.

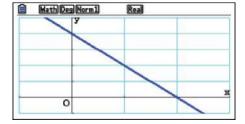
To construct a graph of this model, press n2f+40l. To select the view window, press Le(V-Window). Change the values for the window, as shown, pressing I after each value. The values for Scale determines the location for the marks on the axes and the gridlines. Press d to return to the editor.





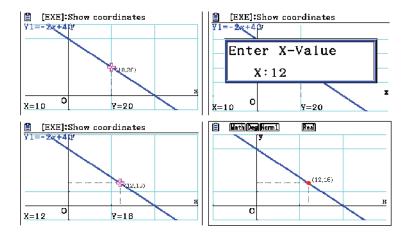


To draw the graph, press u(DRAW). When a graph is displayed the + key can be used to zoom in, the - key to zoom out, and \$!BN to scroll.



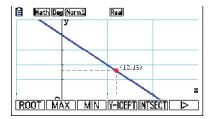
2. How many shirts would be sold at a price of \$12 per t-shirt?

To trace on the graph, press Lq(Trace). Use \$! to move the cursor. To select a specific value, type the value, in this case 12. A dialogue box opens, press I. To mark a point and keep the coordinates on the display, press I a second time.

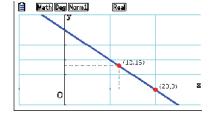


1. There is a price that is too high, meaning no shirts are sold. This point occurs at the x-intercept of the graph (where y = 0) and the value of x is a root of the equation 2x + 40 = 0.

To find the root, press Ly(G-Solv)q(ROOT). The result, \$20, is shown at the bottom of the screen. To mark this intercept and keep the coordinates on the display, press I a second time.

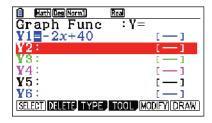


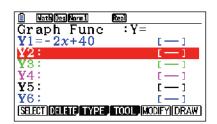


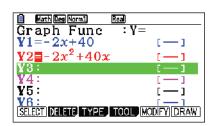


4. If  $\Box 2x + 40$  shirts are sold at price, x, then the number of dollars collected for the sale is  $x(\Box 2x + 40)$  or  $\Box 2x^2 + 40x$ .

To graph this function, first, deselect the previous equation by pressing d, B so the cursor is on Y1, then press q(SELECT)N. Note, the = sign is not highlighted. The cursor should now be on Y2. Press n2fs+40fl.

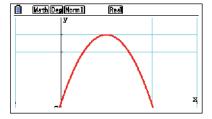






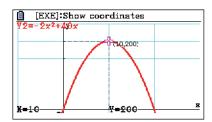
To set up the view window, press Le(V-Window). Change the values for the window so that Ymax is 250 and Yscale is 50. Press d to return to the editor. To draw the graph, press u(DRAW).

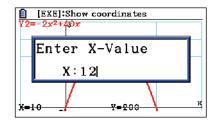
View Window
max :30
scale:10
dot :0.1058201
Ymin :-10
max :250
scale:50

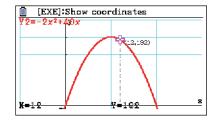


#### 5. Compute the number of dollars eamed, if each t-shirt is sold at \$12.

To compute the number of dollars earned if shirts are sold for \$12, press Lq(Trace). Type the value, in this case 12. A dialogue box opens, press I. The models predict that at a price of \$12, 16 shirts will be sold for a total of \$192.

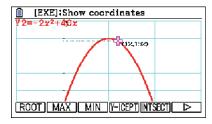


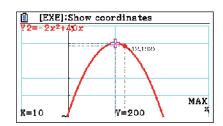


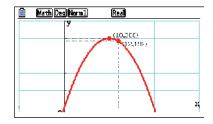


#### 6. Determine the price that will give the greatest profit.

To determine the price that is predicted to make the most money, press Ly(G-Solv)w(MAX). The results, \$10 and \$200, are shown at the bottom of the screen. To mark the point and keep the coordinates on the display, press I.

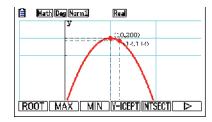


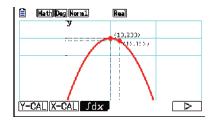


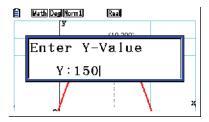


#### 7. Determine the price of each t-shirt in order to collect \$150.

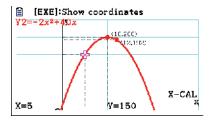
To determine the price of each t-shirt, in order to collect a total of \$150, press IJ J(G-Solv) J (▷) J (X-CAL)IJJ J J J. (The (▷) symbol moves to the next page of commands.)

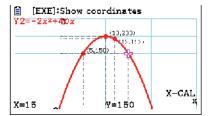






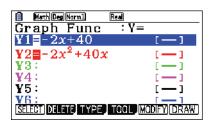
There is another point where y = 150. Use C to move to the next point. Press | to mark one or both of these points. \$150 can be earned by selling shirts at \$5 or at \$15.

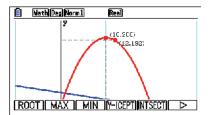


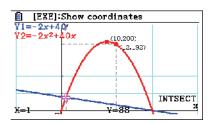


#### 8. Find the intersection of the equations in Y1 and Y2.

Although it is not particularly meaningful in this example, a common problem is to find the intersection point of two graphs. Press d to return to the editor. Highlight Y1 and press q(SELECT). Now, both graphs will be drawn. Press u(DRAW). To find the intersection points for the two graphs, press y(G-Solv) J(INTSECT). 38 shirts are sold at the price of \$1, for a total of \$38. (These graphs also intersect at (20, 0) where no shirts were sold.)

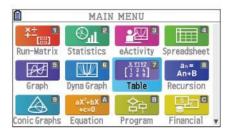


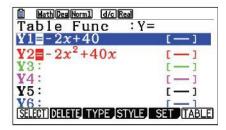




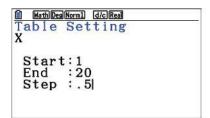
1. Construct a table of values that shows the price, number of shirts, and total dollars using increments of \$0.50.

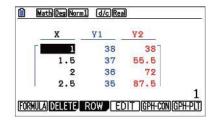
To construct tables, from the Main Menu, press 7. The equations for the functions appear if they have been previously entered, including those entered in the Graph menu.



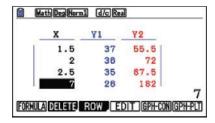


To set the initial value, end value and the increment, press y(SET). Enter the values for Start, End and Step. Press I after entering each value, then press d. To display the table, press u(TABLE). Use N to scroll through the table.





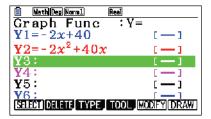
Note:valuesinthex-columncanalsobechanged manually.Pressanyvaluedesired,then pressl.Here,thevalue of 3 was changed to 7.

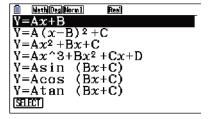


#### **GRAPH-MODIFY**

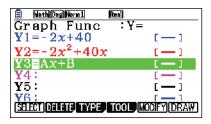
1. Explore how the graph of the function y = Ax + B changes for different values of A and B.

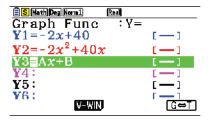
From the Main Menu, press 5. Use q(SELECT) to deselect any functions and N to move to a new line; in this screen shot, it is Y3. Press r(TOOL)I (BUILT-IN). With Y=Ax+B, highlighted, press q(SELECT).

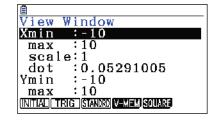




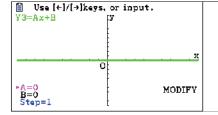
To use a standard window, press LI (V-Window)I (STANDRD)d.

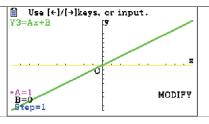


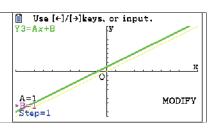




Press y(MODIFY). A graph is drawn based on values stored to A and B. Values for the variables are displayed in the lower left portion of the screen. The active value is magenta, in this case, A. Press C to increase A by the value shown as Step. Press to decrease A. Alternately, press any number keys to change the value of A. A dialogue box opens displaying the new desired value, then, press I. Notice, the previous graph is drawn in faint yellow. Use NB to change the value of a different variable or the value for Step.



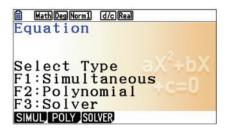


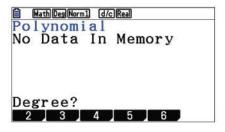


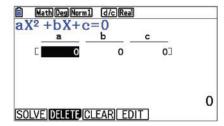
### **EQUATION**

1. The equation  $\Box 2x^2 + 40x = 150$  was previously solved in the Graph menu. It can also be solved in the Equation menu by transforming it to  $-2x^2 + 40x - 150 = 0$ .

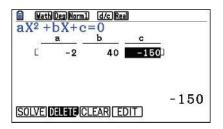
Press pf(A). (It is not necessary to push a.) To solve polynomial equations, press w(POLY). Press q(2) for a second degree polynomial.

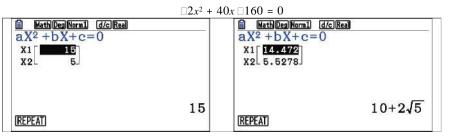






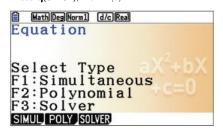
Enter the 3 coefficients, pressing I after each one. Note, equations must be in standard form to solve. To solve, press q(SOLVE). Both solutions are displayed. Note, when solutions are not rational, both a decimal and an exact solution are displayed. The third screenshot displays the solutions to .

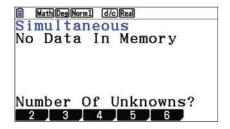


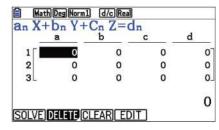


The Equation menu can also be used to solve linear systems. Within the Equation menu, press Ld(QUIT).

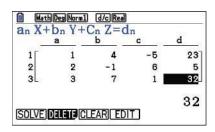
Press q(SIMUL), then w(3).

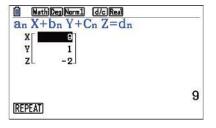






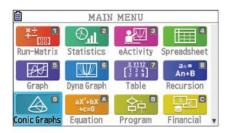
Enter all 12 values, pressing after each one. To solve this system, press q (SOLVE).

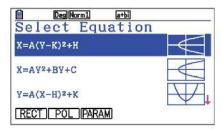


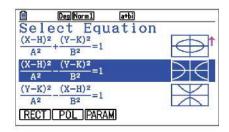


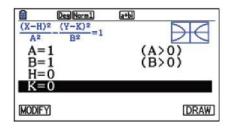
1. Construct the graph of the conic  $\operatorname{sect}(\frac{(y-3)^2}{4} - \frac{(y+1)^2}{16} = 1$ 

From the Main Menu, press 9. Scroll down to the correct form and press I.

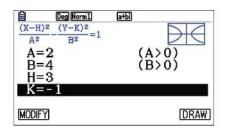


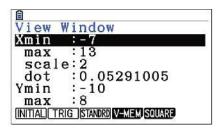


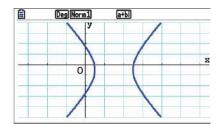




Enter the correct values. Note, the exponents in the denominators, so A = 2, rather than 4. Also, note the minus signs in the numerator, so H = 3 and K = -1. Press I after each value. As before, press Le(V-Window) to change the values for the window, then press d. To draw the graph, press u(DRAW).

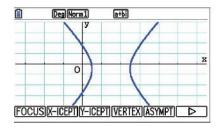


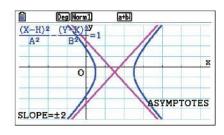




2. Find the asymptotes for the conic graph.

To draw the asymptotes, press Ly(G-Solv)y(ASYMPT). The slope for each line is also displayed.

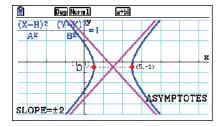


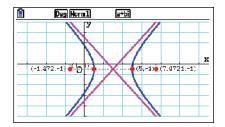


## CONICS

#### 3. Find and label the vertices and foci for the conic graph.

To find the coordinates of the vertices, press Ly(G-Solv)r(VERTEX). To find the coordinates of the foci, press Ly(G-Solv)q(FOCUS). In each case, press \$ to move to the second point. To mark points and label the coordinates on the display, press \$.



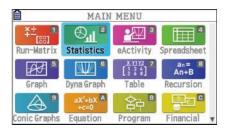


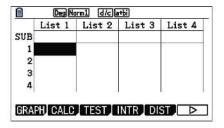
### **STATISTICS**

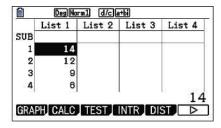
1. Suppose one of the questions asked on a survey was "What type of pet do you have?", and the results from 50 people are shown in this table. Construct a pie chart and a bar chart of these data.

Pet Category	Dog	Cat	Fish	Bird	Other	None
Frequency	14	12	9	6	4	5

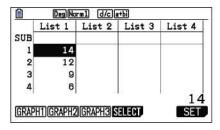
From the Main Menu, press 2. The list editor opens. Enter the values in the table in List 1, pressing | after each value.



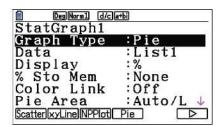




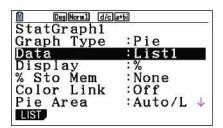
To construct a graph, press q(GRAPH). Then, press u(SET). Scroll to Graph Type and select r(Pie).



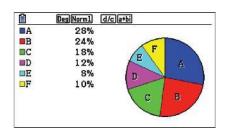




If necessary, scroll to Data and change to List1. Display can be used to select percentages or counts with the chart. Press d and q(GRAPH1). The color and shading of plots can be changed by using L5(FORMAT).

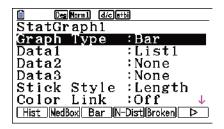


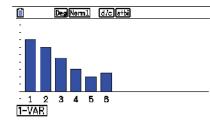
	List 1	List 2	List 3	List 4
SUB				
1	14			2
2	12			
2 3	9			
4	6			

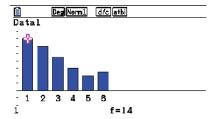


## **STATISTICS**

To change to a bar chart, press du(SET)Nu ( $\triangleright$ ) e(Bar). Press dq(GRAPH1) to view the bar chart. To display the frequencies, press Lq(Trace).



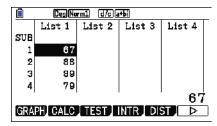




2. The number of games won (out of 162) by a certain baseball team for the years 2002 – 2013 are shown in the table. Construct a histogram and a boxplot for these data.

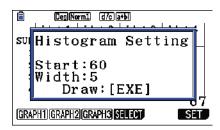
67	88	89	79	66	85
97	83	75	71	61	66

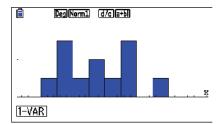
Enter these data in the list editor. To set StatGraph1 to a histogram, press q(GRAPH) and u(SET). For Graph Type, select q(Hist).



Deg Norm1 d/c	a+bi
StatGraph1	
Graph Type	:Hist
XList	:List1
Frequency	: 1
Color Link	:Off
Hist Area	:Blue/L
HistBorder	:Black
Hist MedBox Bar (	N-Dist Broken ▷

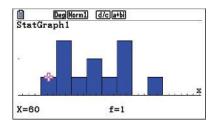
Press dq(GRAPH1). Select Start and Width values to determine the rectangles that will be plotted. Press q(1-VAR) to see the statistical analysis of the data.



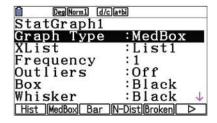


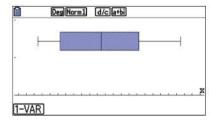
## **STATISTICS**

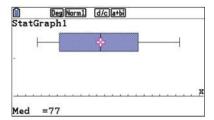
Press u(DRAW) to return to the plot. To display the frequencies, press Lq(Trace).



To change to a box-and-whisker plot (boxplot or median box plot), press du(SET). Scroll to Graph Type and press w(MedBox). Press dq(GRAPH1). To display the minimum, maximum, and quartiles, press Lq(Trace). Use \$ to display the next value.



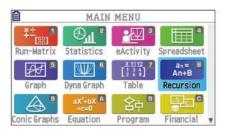


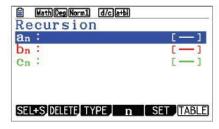


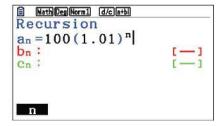
#### RECURSION

1. Suppose \$100.00 is deposited into a savings account with an interest rate of 4% compounded quarterly. How much is in the account for each of the first 8 quarters?

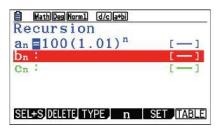
Because this is a discrete model, it can be modeled as a sequence. Although the menu says Recursion, it can be used for both explicit and recursive sequences. From the Main Menu, press 8 to open the sequence editor. If the type is not an, press e(TYPE)q(an). The account pays 1% per quarter so enter the formula as shown, using q(n) for n. Press I.

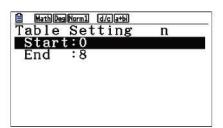


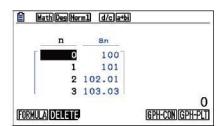




To create a table of values, press y(SET). Select Start and End values and press I after entering each value. To display the table, press d u(TABLE).







This sequence can also be viewed as a graph. Before plotting the graph, set a window by pressing Le (V-Window). Press d. To see the graph, press u(GPH-PLT). To trace on the graph, press Lq(Trace).

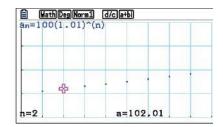
View Window

Xmin :0
max :9
scale:1
dot :0.02380952

Ymin :90
max :130

INITIAL TRIG STANDED V-MEM SQUARE

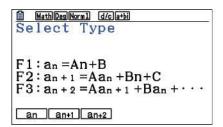


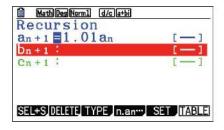


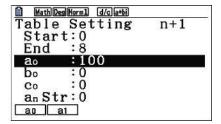
#### RECURSION

The sequence can also be created as a recursive formula. Return to the editor using Ld(QUIT). To change

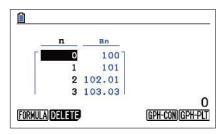
the type, press  $e(TYPE)w(a_{n+1})$  and edit the equation. To insert  $a_n$ , press  $w(a_n)$  then I. To specify the initial value, press y(SET). For  $a_0$ , enter 100I.

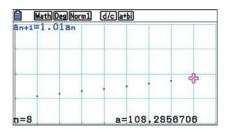






To see the table, press du(TABLE). To view a graph, press u(GPH-PLT).

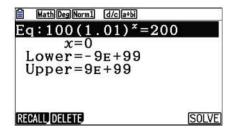


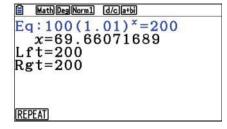


2. How long will it take for the account to double in value to \$200.00?

One good way to answer this question is to return to the Equation menu. Press pf(A). To enter the equation, press e(SOLVER). If e(SOLVER) is not an option, press d until it is. To insert the =, press L.(=). Once the equation is entered, press | or u(SOLVE). It will take 70 quarters or 17 | years for the investment to double.





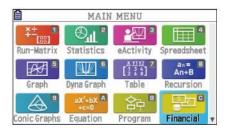


2

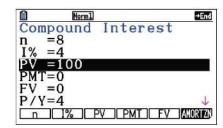
Financial analysis can be done from the Finance menu (CJ).

1. Compute the amount in the account (from our previous example) after 8 quarters.

To compute the amount in the account after 8 quarters, use compound interest. For compound interest, press (J(COMPND)). Enter the values, as shown, for n, I%, PV, and P/Y. PV is the present value, the initial amount. P/Y is the number of payments per year. Remember to press J after entering each value.





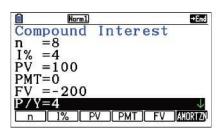


To compute the future value, press y(FV). The negative sign is correct, as a reasonable interpretation is that \$100 was deposited and \$108.28 can be withdrawn. This value agrees with the previous result from the Recursion menu.



2. Determine how long it will take for the account to double in value to \$200.00.

To determine how long it will take for the account to double in value to \$200.00, press q(REPEAT). For FV, enter nLJEJEJJ, then press q(n). This value agrees with the previous result from the Equation menu.

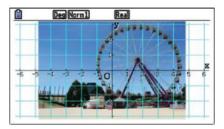




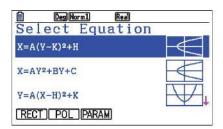
## CONIC GRAPHS

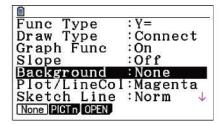
#### CONIC GRAPHS IMAGE BACKGOUND

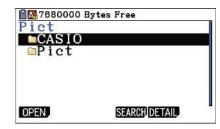
1. What is an equation for a circle in the image?



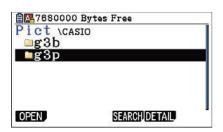
From the Main Menu, press 9. To select a background, press Lp(SET UP). Scroll to Background and press e(OPEN). Highlight the CASIO folder and press q(OPEN).

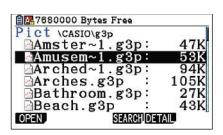


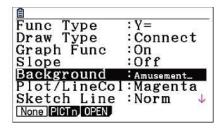




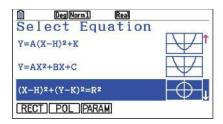
Scroll down to the g3p folder and press q(OPEN). Scroll down to Amusem~1.g3p and press q(OPEN).

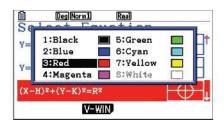


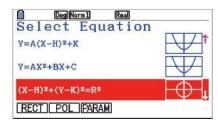




 $Press\ d.\ Scroll\ down\ to\ the\ equation\ for\ the\ circle\ and\ press\ I.\ To\ change\ the\ color,\ press\ L5(FORMAT)3(Red).$ 

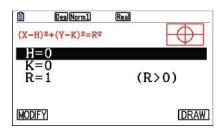


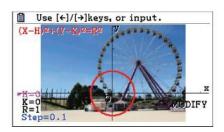


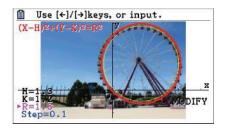


## CONIC GRAPHS

Press q(MODIFY). Modify the coefficients to find a good model.



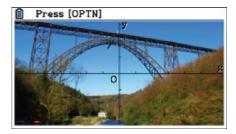




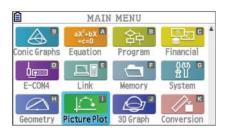
## PICTURE PLOT

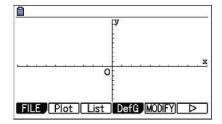
As an alternate to Modify, the PRIZMTM fx-CG50 allows you to plot points on a image and use regression to find a model.

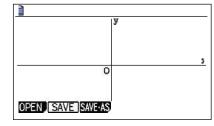
1. What is an equation for a line in the image?



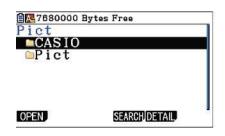
From the Main Menu, press ((I). To open the image, press iq(FILE)q(OPEN).

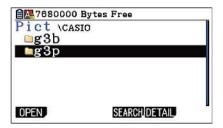


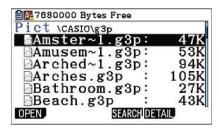




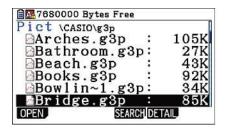
Highlight the CASIO folder and press q(OPEN). Scroll down to the g3p folder and press q(OPEN).

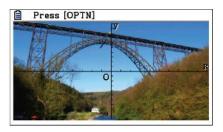


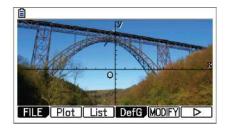




Scroll down to Bridge.g3p and press  $q(\mathsf{OPEN})$ . To plot points, press  $iw(\mathsf{Plot})$ .

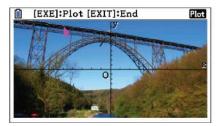


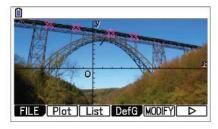


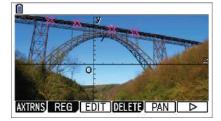


## PICTURE PLOT

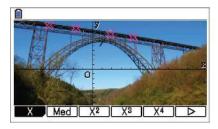
Use the direction wheel to move the arrow to a point on the line. Press I to mark the point. Continue to mark several additional points. When done, press d. To perform a regression, press u (>) w(REG).

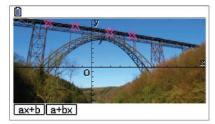






For linear regression, press q(X) and select either form. Here, w(a+bx) is used.



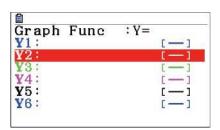


```
LinearReg(a+bx)

a =8.05264846
b =-0.299065
r =-0.996656
r<sup>2</sup>=0.99332334
MSe=0.01389523
y=a+bx

COPY DRAW
```

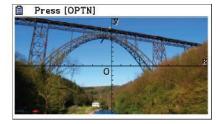
To save the result, press y(COPY). The display is improved if the graph is not blue, so scroll to Y2 and press I. Press (DRAW) to view the equation of the line. The graph is drawn but as a thin blue line.



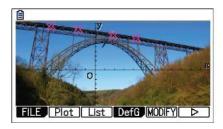
```
LinearReg(a+bx)

a =8.05264846
b =-0.299065
r =-0.996656
r<sup>2</sup>=0.99332334
MSe=0.01389523
y=a+bx

COPY DRAW
```



To draw the graph that was saved, press ir(DefG)u(DRAW).



```
Graph Func : Y=

Y1: [-]

Y2=8.05264846665[-]

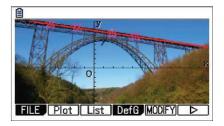
Y3: [-]

Y4: [-]

Y5: [-]

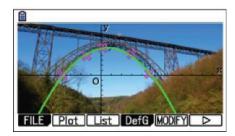
Y6: [-]

SELECT DELETE Y STYLE DRAW
```



# PICTURE PLOT

In a similar manner, a quadratic model can be used for another portion of the bridge.



## NOTES



## **See the complete line of Casio calculators**

